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The MARINE CORPS GAZETTE

Colonel Louis McC. Little, U. S. Marine Corps, Editor

Vol. XIV SEPTEMBER 1929 No. 3

CONTENTS

BRIGADIER GENERAL CYRUS S. RADFORD, U. S. M. C. ..... *Frontispiece*
Quartermaster of the Marine Corps

BRIGADIER GENERAL CYRUS S. RADFORD U. S. M. C. 150
By CAPTAIN JOHN H. CRAIGE, U. S. M. C.

THE CAPTURE OF JOHN BROWN 153
With Introduction by CAPTAIN JOHN W. THOMASON, JR. U. S. M. C.

PORT ARTHUR—NOVEMBER 22, 1894 159
By COLONEL H. C. REISINGER, U. S. M. C.

COMBAT OPERATIONS IN NICARAGUA 170

AIRCRAFT IN BUSH WARFARE 180
By MAJOR ROSS E. ROWELL, U. S. M. C.

WITH ROY CHAPMAN ANDREWS IN MONGOLIA 204
By CAPTAIN W. P. T. HILL, (A. Q. M.) U. S. M. C.

THE SELECTION OF ADVANCED BASES 216
By LIEUTENANT COMMANDER E. W. BROADBENT, U. S. N.

MARINE CORPS COMMUNICATIONS 221
By CAPTAIN G. E. COLE, U. S. M. C.

PROFESSIONAL NOTES 226

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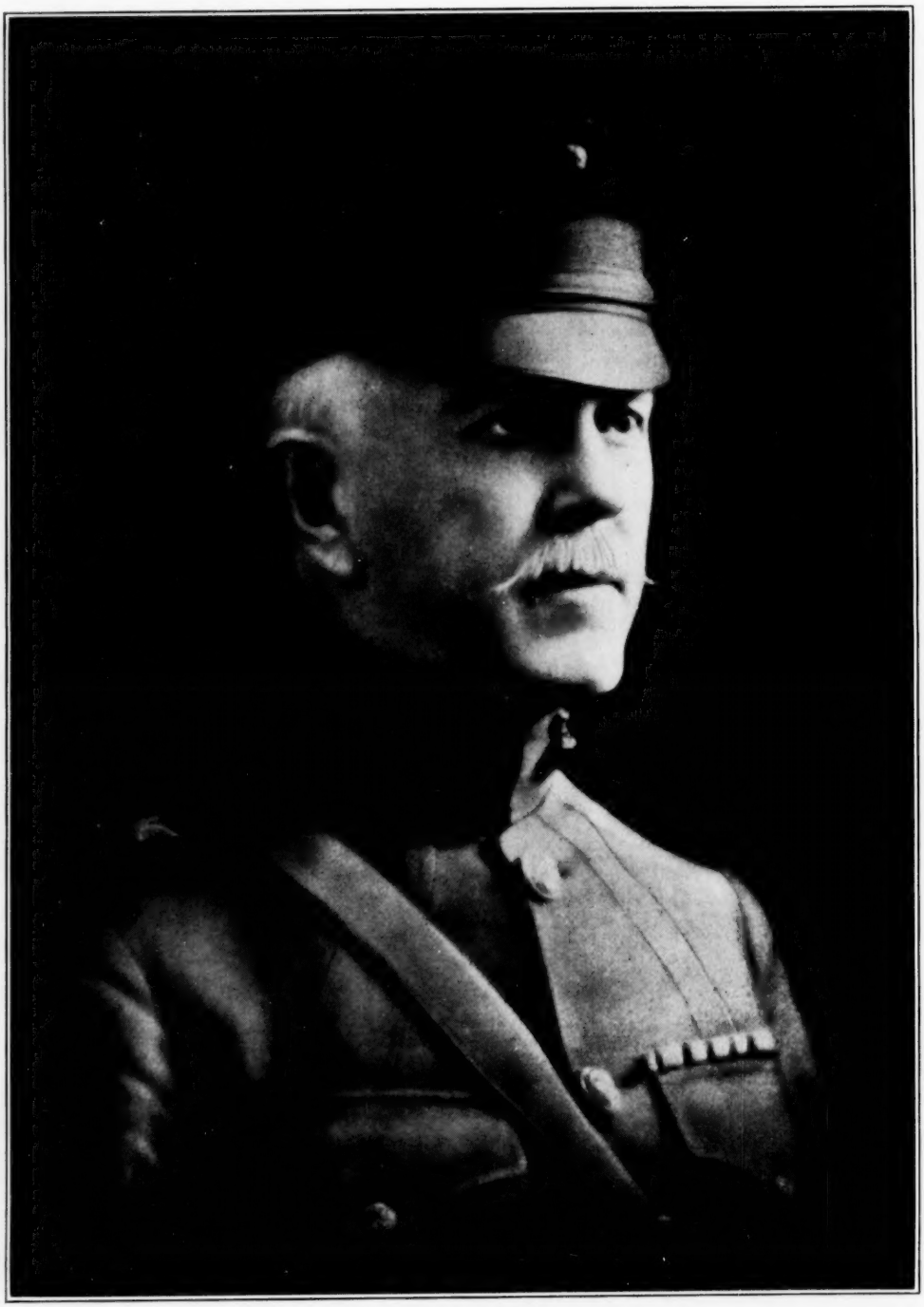


Brigadier General Cyrus S. Radford, U. S. M. C.,
Quartermaster of the Marine Corps

The Marine Corps Gazette

Vol. XIV SEPTEMBER 1929 No. 3

BRIGADIER GENERAL CYRUS S. RADFORD, U. S. M. C

By CAPTAIN JOHN H. CRAIGE, U. S. M. C.

ACCORDING to Homer, Solon, the great Athenian lawgiver, once told Croesus, King of the Lydians, that a wise man builds his monument while he still lives. Then as the king was starting to write out an order calling out the engineers and the stone cutters of his domain, the sage went on to explain that by a monument he did not mean a mausoleum of brick and marble, but some sort of enduring good work by which his fellow men might profit.

Considered in this light, a Marine officer who has built himself a monument is Brigadier General Cyrus S. Radford, recently appointed Quartermaster. General Radford's monument is the Marine Corps Quartermaster Depot, at Philadelphia, and the system of unified supply on which that organization is based. No other military corps in the world enjoys the benefits of a similar supply unit.

It is impossible to over-estimate the part played by the Depot in enabling the Marine Corps to build up the high reputation for mobility and efficiency it enjoys Everything Marines use in war and peace from tooth-picks to machine guns is supplied from this source. Fur caps to turn the Arctic winds and mosquito nets to keep out tropical pests are ranged side by side on its shelves. Steel field ranges are turned out in one department and underwear in another. One shop makes uniforms, another mess equipment, a third supplies shoes, a fourth is stocked with rifles, pistols and ammunition, while a fifth keeps the trucks, automobiles and rolling stocks of the Corps in condition. In fact every article supplied to Marines in barracks, camp or field, comes from the Depot and bears its mark.

In the course of years with the growth of the Marine Corps, the Philadelphia Depot has developed into a gigantic business enterprise favorably

comparable with the largest of the Nation's commercial merchandising establishments. The Depot's output for the year just past totaled nearly five million dollars worth of goods. Its payroll ran well over the million dollar mark while it had on its shelves at the end of the year more than ten million dollars worth of supplies. The Depot carries on its payroll more than six hundred men and women employees and its plant takes in the greater part of a city block in the seven-story building at 1100 South Broad Street, not to mention about six city blocks of ware-house space at the Snyder Avenue storehouses on the Delaware River. More than twenty million pounds of equipment was shipped to Marines all over the world during the year of 1928.

In building up this enormous industrial structure, Colonel Radford found it necessary to educate himself both as manufacturer, merchandiser and financier. Many of the systems now employed by the great merchandising and mail order houses of the country were first invented and perfected by the Marine Corps Depot. Through the study necessitated by his duties, Colonel Radford has won recognition in the commercial marts of Philadelphia as one of the city's most expert judges of the raw material markets and of manufacturing generally. His advice is eagerly sought in many matters having nothing to do with the Marine Corps or the Quartermaster Department and his connections with the financial affairs of the city are extensive. He has recently been elected Vice-President of the Bankers Trust Company of that city.

A sketch of the origin and development of the Marine Corps Quartermaster Depot may be of interest to the officers of the Corps which it serves. Its history as it is at present constituted began when Colonel Radford came to Philadelphia more than twenty-six years ago with the fixed determination in his mind to create in that city a business organization capable of supplying promptly and acceptably all the manifold articles needed by the Corps for its many uses. Previous to that time, as an officer in the field he had suffered from lack of necessary equipment and the aggravating delays which were the rule under the old system, and when he entered the Quartermaster Department he set about looking for ways and means of effecting a change for the better.

The situation which confronted the Marine Corps was a difficult one to meet. The activity and commercial expansion of the United States following the Spanish War had so extended American interests that calls for Marines came in to Washington almost daily. Marine forces were in China, the Philippines, in Guam, in Panama, in Nicaragua, in Cuba and many other foreign countries. From 1898 to the close of the World War there was only one year, 1913, in which no Marine Corps expeditions were sent out and during some years there were as many as half a dozen.

Sometimes a battalion would be sent, sometimes a regiment, occasionally

a brigade. The standard supplies and stores of a battalion weigh in the neighborhood of two hundred and fifty tons, a regiment more than three times that much and a brigade seven to ten times. Under the old system there was no one place in which all these supplies could be found and when orders were received to send an expedition on its way, there would be wild rushing around to lofts, storehouses, navy yards, etc., in search for equipment, with results that can be imagined.

This system Colonel Radford resolved to supplant by the creation of a central depot and storehouse where all articles used by Marines could be manufactured or purchased and stored in sufficient quantity for the equipment of one or a dozen expeditions at a moment's notice. Owing to its strategic location and its qualities as manufacturing center and an industrial mart, Philadelphia was chosen as the site for the new enterprise, and in 1904 a small building was erected on the site at Broad Street and Washington Avenue where the Depot is located. This has been added to and expanded until the parent plant at present covers the whole of a city block while the store-houses at Snyder Avenue cover an additional area of almost six blocks.

From this enormous plant is supplied all articles used by the 17,500 marines who make up that Corps. Nearly all clothing, leather goods, metallic articles, etc., are manufactured from raw material purchased here. A few products including shoes, typewriters, automobiles, firearms and ammunition are purchased complete.

In addition to this current business the Depot maintains large reserves of stores of all sorts, so that expeditions of any size may be fitted out complete to the last detail within twenty-four hours. If a battalion or a regiment or a brigade is to be sent overseas for foreign service, all that the Corps Headquarters in Washington has to do is telegraph the Philadelphia Depot the size of the organization that is going and whether its service is to be in the tropics or the arctic or the temperate zone in between and send a transport up the Delaware to receive the equipment.

Colonel Radford is a graduate of the U. S. Naval Academy of the Class of 1890. He was commissioned a Second Lieutenant of the Marine Corps in 1892, and served aboard the Battleship Texas during the battle of Guantanamo Bay, during the destruction of the Spanish Fleet, in the war with Spain in 1898. He was a member of the Marine expeditionary force to the Philippines in 1901 and 1902 and served in Panama in 1904 and in Cuba in 1906.

THE CAPTURE OF JOHN BROWN

Introduction by CAPTAIN JOHN W. THOMASON, JR., U. S. M. C.

A Letter written by First Lieutenant Israel Green, U. S. M. C., appearing in *The North American Review,* of December, 1885.

IN THE late summer of 1859 a hard eyed, grey bearded, medium sized man rented a farm in Maryland, a few miles north of Harper's Ferry, and gave out that his name was Smith, and that he was going to make a crop. The neighbors paid no particular attention to him.

On Sunday night, 16 October, about the time the pious citizens of Harper's Ferry were going home from church, this man, with some twenty whites and negroes, armed with Sharp's rifles, and carrying several wagon loads of firearms, pikes and cutlasses, entered the little town, cut the telephone wires, shot the watchman—a free negro—on the railroad property at Harper's Ferry, and took possession of the United States Arsenal, which was the only important establishment in the place. Details were then sent out from the Arsenal to secure citizens as hostages in case of retaliatory measures by the civilian population. These details were charged with the additional mission of freeing and arming such negro slaves as they could find, but without exception the slaves refused to accept their benefactions and all who were not forcibly detained fled from them. Among the citizens dragged from their beds and transported to the Arsenal was Colonel Lewis Washington, a grandnephew of George Washington.

When Monday morning came the raiders were disposed in the large armory building and in the small, stout, stone house near it, where the fire engines and hose carts were stowed.

Every man in town who had a weapon armed himself and hastened to the place. The local Virginia militia began to assemble and shots were exchanged during the morning, in the course of which the raiders were driven from the armory with some loss, and all took refuge in the engine house. Among those killed by the raiders was the Mayor of Harper's Ferry. The militia then besieged the raiders from a respectful distance.

The telegraph wires having been cut, the first word was sent out by officials of the B. & O. Railroad, whose trains stopped short of Harper's Ferry as they approached from Frederick Junction in Maryland. Baltimore had the news early Monday morning, Washington during the forenoon, and Richmond during the afternoon. Maryland militia was ordered out to guard the Maryland Bank of the Potomac. Governor Wise of Virginia ordered the mobilization of Colonel Gibson's militia infantry regiment, and Colonel Baylor's militia cavalry, both in the vicinity of Harper's Ferry, and he pre-

pared to accompany the Richmond regiment to the scene in person. In Washington, the Federal Government sent for the coast artillery at Fort Monroe, designated Lieutenant Colonel R. E. Lee, then on leave at his home, Arlington, to proceed to Harper's Ferry and take command of the United States forces, and despatched, from Marine Barracks at Washington, 90 marines under the command of Lieutenant Israel Green, U. S. M. C., to report to the senior United States officer at Harper's Ferry and suppress the riot. There appear to have been no regular troops available elsewhere. Lieutenant J. E. B. Stuart, 1st U. S. Cavalry Regiment, was on leave in Washington and accompanied Lieutenant Colonel Lee as aide. Washington had the report that Ossawattomie Brown of Kansas was the leader of the raid, and Stuart was the only man of those who went to Harper's Ferry who knew Brown personally; they had met in Kansas in 1856 when the 1st Cavalry was sent to restore order after the murders on Pottawatomie Creek, in which old Brown was implicated. In the following account by Lieutenant Green, the name is given as Stewart, but J. E. B. Stuart is the soldier he refers to. Here follows Lieutenant Green's story in his own words:

"At noon of Monday, October 18, 1859, Chief Clerk Walsh of the Navy Department drove rapidly into the Washington Navy Yard, and, meeting me, asked me how many marines we had stationed at the barracks available for immediate duty. I happened to be the senior officer present and in command that day. I instantly replied to Mr. Walsh that we had 90 men available and then asked him what was the trouble. He told me that Ossawatomie Brown of Kansas, with a number of men, had taken the Arsenal at Harper's Ferry and was then besieged there by the Virginia state troops. Mr. Walsh returned speedily to the Navy Department Building and in the course of an hour orders came to me from Secretary Toucey to proceed at once to Harper's Ferry and report to the senior officer and, if there should be no such officer at the ferry, to take charge and protect the government property. With a detachment of 90 marines I started for Harper's Ferry that afernoon on the 3:30 train, taking with me two howitzers. It was a beautiful clear autumn day and the men were exhilarated by the excitement of the occasion, which came after a long, dull season of confinement in the barracks, and enjoyed the trip exceedingly.

"At Frederick Junction I received a despatch from Colonel Robert E. Lee, who turned out to be the army officer to whom I was to report. He directed me to proceed to Sandy Hook, a small place about a mile this side of the Ferry, and there await his arrival. At 10:00 o'clock in the evening he came up on a special train from Washington. His first order was to form the marines out of the car and march from the bridge to Harper's Ferry. This we did, entering the inclosure of the arsenal grounds through a back gate. At 11:00 o'clock Colonel Lee ordered the volunteers to march out of the grounds and gave the control inside to the marines, with instruc-

tions to see that none of the insurgents escaped during the night. There had been hard fighting all the preceding day, and Brown and his men kept quiet during the night. At half past six in the morning, Colonel Lee gave me orders to select a detail of 12 men for a storming party and place them near the engine house in which Brown and his men had entrenched themselves. I selected 12 of my best men and a second 12 to be employed as a reserve. The engine house was a strong stone building, which is still in a good state of preservation at the ferry in spite of the three days' fighting in the building by Brown and his men, and the ravages of the recent war between the States.

"The building was of stone, perhaps 30 feet by 35. In the front were two large double doors, between which was a stone abutment. Within were two old-fashioned, heavy fire engines, with a hose cart and reel standing between them, and just back of the abutment between the doors. They were double battened doors, very strongly made, with heavy wrought iron nails. Lieutenant J. E. B. Stewart, afterwards famous as a cavalry commander on the side of the south, accompanied Colonel Lee as a volunteer aid. He was ordered to go with a part of the troops to the front of the engine house and demand the surrender of the insurgent party. Colonel Lee directed him to offer protection to Brown and his men but to receive no counter proposition from Brown in regard to the surrender. On the way to the engine house, Stewart and myself agreed upon a signal for attack in the event that Brown should refuse to surrender. It was simply that Lieutenant Stewart would wave his hat which was then, I believe, one very similar to the famous chapeau which he wore throughout the war. I had my storming party ranged alongside of the engine house, and a number of men were provided with sledge hammers with which to batter in the doors. I stood in front of the abutment between the doors. Stewart hailed Brown and called for his surrender, but Brown at once began to make a proposition that he and his men should be allowed to come out of the engine house and be given the length of the bridge start, so that they might escape. Suddenly Lieutenant Stewart waved his hat and I gave the order to my men to batter in the door.

"Those inside fired rapidly at the point where the blows were given upon the door. Very little impression was made with the hammers, as the doors were tied on the inside with ropes and braced by the hand brakes of the fire engines, and in a few minutes I gave orders to desist. Just then my eye caught sight of a ladder lying a few feet from the engine house, in the yard, and I ordered my men to catch it up and use it as a battering ram. The reserve of 12 men I employed as a supporting column for the assaulting party. The men took hold bravely and made a tremendous assault upon the door. The second blow broke it in. This entrance was a ragged hole low down in the right hand door, the door being splintered and cracked some distance upward. I instantly stepped from my

Sketched by
Capt. J. W Thomason

Marine Officer—1859

Sketched by
Capt. J. W. Thomason

Enlisted Marine—1859

position in front of the stone abutment and entered the opening made by the ladder. At the time I did not stop to think of it, but upon reflection I should say that Brown had just emptied his carbine at the point broken by the ladder, and so I passed in safely. Getting to my feet I ran to the right of the engine, which stood behind the door, passed quickly to the rear of the house, and came up between the two engines. The first person I saw was Colonel Lewis Washington, who was standing near the hose cart at the front of the engine house. On one knee, a few feet to the left, knelt a man with a carbine in his hand, just pulling the lever to reload.

" 'Hello, Green,' said Colonel Washington, and he reached out his hand to me. I grasped it with my left hand, having my saber uplifted in my right, and he said, pointing to the kneeling figure, 'This is Ossawatomie.'

"As he said this, Brown turned his head to see who it was to whom Colonel Washington was speaking. Quicker than thought I brought my saber down with all my strength upon his head. He was moving as the blow fell, and I suppose I did not strike him where I intended, for he received a deep saber cut in the back of his neck. He fell senseless on his side, then rolled over on his back. He had in his hand a short Sharpe's cavalry carbine. I think he had just fired as I reached Colonel Washington, for the marine who followed me into the aperture made by the ladder received a bullet in the abdomen from which he died in a few minutes. The shot might have been fired by some one else in the insurgent party, but I think it was from Brown. Instinctively as Brown fell I gave him a saber thrust in the left breast. The sword I carried was a light uniform weapon and, either not having a point or striking something hard in Brown's accouterments, did not penetrate. The blade bent double.

"By that time three or four of my men were inside. They came rushing in like tigers, as a storming assault is not a play-day sport. They bayoneted one man skulking under the engine and pinned another fellow up against the rear wall, both being instantly killed. I ordered the men to spill no more blood. The other insurgents were at once taken under arrest, and the contest ended. The whole fight had not lasted over three minutes. My only thought was to capture or, if necessary, kill the insurgents, and take possession of the engine house.

"I saw very little of the situation within until the fight was over. Then I observed that the engine house was thick with smoke, and it was with difficulty that a person could be seen across the room. In the rear, behind the left hand engine, were huddled the prisoners whom Brown had captured and held as hostages for the safety of himself and his men. Colonel Washington was one of these. All during the fight, as I understood afterward, he kept to the front of the engine house. When I met him he was as cool as he would have been on his own veranda entertaining guests. He was naturally a very brave man. I remember that he would not come out

of the engine house, begrimed and soiled as he was from his long imprisonment, until he had put a pair of kid gloves upon his hands. The other prisoners were the sorriest lot of people I ever saw. They had been without food for over 60 hours, in constant dread of being shot, and were huddled up in the corner where lay the body of Brown's son and one or two others of the insurgents who had been killed. Some of them have endeavored to give an account of the storming of the engine house and the capture of Brown, but none of the reports have been free from a great many misstatements, and I suppose that Colonel Washington and myself were the only persons really able to say what was done. Other stories have been printed by people on the outside describing the fight within. What they say must be taken with a great deal of allowance, for they could not have been witnesses of what occurred within the engine house. One recent account describes me as jumping over the right hand engine more like a wild beast than a soldier. Of course nothing of the kind happened. The report made by Colonel Lee at the time, which is now on file in the War Department, gives a more succinct and detailed account than any I have seen.

"I can see Colonel Lee now, as he stood on a slight elevation about 40 feet from the engine house during the assault. He was in civilian dress and looked then very little as he did during the war. He wore no beard except a dark mustache, and his hair was slightly grey. He had no arms upon his person, and treated the affair as one of no very great consequence, which would be speedily settled by the marines. A part of the scene, giving color and life to the picture, was the bright blue uniform of the marines. They wore blue trousers, then, as they do now, and a dark blue frock coat. Their belts were white, and they wore French fatigue caps. I do not remember the names of the 12 men in the storming party, nor can I tell what became of them in later life. We had no use for the howitzers, and in fact they were not taken from the car.

"Immediately after the fight, Brown was carried out of the engine house and recovered consciousness while lying on the ground in front. A detail of men carried him up to the paymaster's office, where he was attended to and his wants supplied. On the following day, Wednesday, with an escort, I removed him to Charleston and turned him over to the civil authorities. No handcuffs were placed upon him, and he supported himself with a self-reliance and independence which were characteristic of the man. He had recovered a great deal from the effects of the blow from my saber, the injury of which was principally the shock, as he only received a flesh wound.

"I have often been asked to describe Brown's appearance at the instant he lifted his head to see who was talking with Colonel Washington. It would be impossible for me to do so. The whole scene passed so rapidly that it hardly made a distinct impression upon my mind. I can only recall the fleeting picture of an old man kneeling with a carbine in his hand, with a

long grey beard falling away from his face, looking quickly and keenly toward the danger that he was aware had come upon him. He was not a large man, being perhaps five feet ten inches when he straightened up in full. His dress, even, I do not remember distinctly. I should say that he had his trousers tucked in his boots, and that he wore clothes of grey—probably no more than trousers and shirt. I think he had no hat upon his head.

"None of the prisoners were hurt. They were badly frightened and somewhat starved. I received no wounds except a slight scratch on one hand as I was getting through the hole in the door. Colonel Lee and the people on the outside thought I was wounded. Brown at the time had only five or six fighting men, and I think he himself was the only one who showed fight after I entered the engine house.

"I have been asked what became of Brown's carbine. That I do not know. My sword was left in Washington, among people with whom I lived, and I lost trace of it. A few years ago, after having come out of the war and gone west to Dakota, where I now live, I received a letter from a gentleman in Washington saying that he knew where the sword was and that it was still bent double, as it was left by the thrust upon Brown's breast. He said that it was now a relic of great historic value and asked me to assent to the selling of it upon the condition that I should receive a portion of the price of the weapon. To me the matter had very little interest and I replied indifferently. Since then I have heard nothing of the matter. I presume the saber could be found somewhere in Washington."

In the legal procedure following the suppression of the raid, the matter of concurrent jurisdiction was involved. Old Brown had committed outrages on Federal property,—the Arsenal and grounds,—and against the persons of citizens of Virginia. And the vexatious slavery issue entered, in that old Brown was widely considered to be the instrument and the prophet of the abolitionists. The Federal Government, with the 1860 elections in sight, was very willing to relinquish jurisdiction to the State of Virginia, and John Brown was handed over to the court at Charlestown.

The Virginians, who love courage wherever they see it, were frank in their admiration of old Brown's nerve. "He was the gamest man I ever saw," declared Governor Wise. He received a trial which he himself characterized as entirely fair, and he was expeditiously hanged in early December, 1859, at Charlestown, which is now in West Virginia.

The contemporary records show a remarkable state of calm in Virginia over the whole proceedings. But when it became evident that a large section of the North considered old Brown, who had projected in a southern state a slave insurrection, with all of its attendant horrors, to be a Christian martyr, the South reacted angrily and, in the end, no other single event influenced more deeply the growing rift between the sections.

PORT ARTHUR—NOVEMBER 22, 1894

By Colonel H. C. Reisinger, U. S. M. C.

While on the same cruise as the marine officer of the U. S. S. BALTIMORE, during which General Elliott led his guard through the night on his memorable march from Chemulpo to Seoul, Korea, (related in the last issue of the Marine Corps Gazette) he had another interesting experience—that of visiting Port Arthur the morning after its capture by the Japanese. He was relieved from duty guarding the American interests at Seoul in September, 1894, and returned to the BALTIMORE with the Marine Guard. The latter part of October found the ship at anchor in Chefoo. At that time the Chinese fleet, having suffered defeat at the Battle of Yalu had, after a stay in Port Arthur, retired to Wai-hai-wei. There the fleet remained under Admiral Ting until eventually destroyed or captured in the taking of that harbor by combined land and naval attack of the Japanese in February, 1895. This inactivity of Admiral Ting was due, judging from contemporaneous history, to orders from Peking. Every time the Admiral showed a commendable desire to take to the sea, he was directed to remain within the protection of the forts of Wai-hai-wei.

The Japanese took Port Arthur November 21, 1894. It is rather a curious fact that although the General appears to have been fully alive to his opportunity for observation along military lines during his visit to Port Arthur and made good use of it, he spun this yarn because his recollection centered upon two incidents purely non-military in character. As he puts it, with reference to the Japanese officer who conducted him to the Chinese defensive lines around Port Arthur: "So far as I can remember, the most hard-boiled, unsympathetic cuss I ever ran across was the Japanese captain of artillery who acted as my guide in Port Arthur back in 1894 the day after the Japanese captured the place from the Chinos." Then he chuckled, his memory being mellowed by the passing of many years.

The second incident most vivid in his recollection of that visit has to do with the presence of a high-caste Chinaman and his child in the mob of coolie refugees streaming eastward along the road from Port Arthur, whom he was instrumental in aiding to safety.

"I told you about our march from Chemulpo to Seoul, Korea," said General Elliott when I asked him for this story. "That was an awful hike. I was then attached to the U. S. S. BALTIMORE, flagship of the Asiatic Squadron and flying the flag of Admiral Carpenter. Well, I rejoined the BALTIMORE with my men at Chemulpo the latter part of September after Lieutenant Gill of the Navy relieved my command at Seoul. Gill had with him a mixed detachment of marines and sailors from

the CONCORD. We were all well pleased to quit Seoul—it was not much of a place in those days and we had been there for two and a half months.

We naturally had been constantly in touch with the Chinese-Japanese fight and you might say almost in the middle of it at times. By the time we left Korea the Japs were in full control, and had chased the Chinos off the sea. This was in October, 1894. The Japs had the best of the war all the way through. Their ships were better in the matter of speed and quick-firing guns and better manned and their squadrons organized with a centrally controlled fleet for war. On the other hand, the Chinese squadrons acted independently of each other, lacked cohesion and their commanders were constantly interfered with by orders from Peking.

The land forces were in much the same relation; the Japs better trained, armed and equipped and officered than the Chinese. In the main the Chinos were recruits or conscripts and lacking in knowledge of rifle and artillery fire. The only Chinese force of any consequence was the Army of Li Hung Chang and that had deteriorated through the ageing of old Li and the impossibility of his continuing his active interest in them. As I recollect it, he was the Viceroy to first fortify Port Arthur and who tried to make it a strong naval base.

After the naval battle of Hai-Yang-Tao the defeated Chinese fleet retired to Port Arthur for repairs. The Chinos then also held Wei-hai-wei, so they had two fine harbors in the Gulf of Chihli available for their fleets, and they skipped back and forth between the two. Following their victory, the Japs decided to capture Port Arthur by combined land and naval operations so as to provide themselves with a suitable base and repair depot commanding the Gulf. Sometime in October we had word while in Chefoo of the mobilization of an army under Field Marshal Oyama and later that it had landed at a point some seventy or eighty miles northeast of Port Arthur. The Japanese fleet which rendezvoused at Ping Yang so efficiently furnished escort and covered the concentration of Oyama's force that it was never interfered with by the Chinese warships. The Chino fleet was then in Wai-hai-wei but made no move. This army's first attack was directed on Kinchow, which city was taken early in November. After the fall of Kinchow, the Japanese based on Talienwan.

The BALTIMORE was then in Chefoo and about this time we received word early one morning that Port Arthur had fallen. We got under way at once and after a rough passage arrived before Port Arthur that afternoon and anchored with half a gale kicking up quite a sea.

The wind was out of the west, so we ran in under the lee of the promontory and dropped anchor about one mile south of the fort on Golden Hill. As the fort was flying the Chinese flag, we knew the rumored fall of the port was incorrect. From our anchorage the heights of Golden Hill

hid the navy yard and the town but through the gap of the harbor entrance we could see the hills to the north. East and West Port within were perfectly screened and landlocked. The outer harbor at Port Arthur is dominated by continuous high ground to west and north, and each hill seemed to have its fort, the whole line fairly bristling with armament. The hills were barren and slate gray in color, some of them 400 feet high, the place being endowed by nature with topographical utility and not much scenic beauty. The defenses are said to have been designed by a German expert, although the actual building was done by French contractors. It was as impregnable as nature and science could make it—it lacked trained defenders. The name "Port Arthur" was given it by the British, in honor of Prince Arthur, afterwards Duke of Connaught. There have been several Chinese names for the place.

We were at dinner when the bridge picked up a signal from Golden Hill which read about like this: "Please ride out gale if you can." There was considerable discussion as to what this message could mean or why it had been sent and none of us came to a satisfactory solution. We all suspected it somewhere hid the well-known guile of the Chinese. Later, we had good reason to believe that it was a polite request for us to stay where we were long enough for them to get our dimensions from Brassey, they having identfiied the BALTIMORE, and then work out the range to our anchorage. They certainly used us for a ranging point later on that day.

While we were at mess word came below that two small ships were coming in from the east and we went on deck to see what would happen if they came within range of the forts. The ships were of the Japanese navy—two very tiny torpedo boats—and they came directly to the BALTIMORE'S anchorage.

We were hailed by an officer of the leading ship. "What ship is that?" he demanded, in excellent English. We identified ourselves and when he was satisfid he led his consort under our port quarter almost within our boat booms, but not quite—to come inside would have been gross international discourtesy—and there the two of them lay for quite a while, in fact, until almost dusk. The wind still held fresh from the west, so that the Jap ships were screened by the BALTIMORE from fire and observation.

About dusk these two torpedo boats suddenly shot out from us and headed for the inner harbor. They had gone about one hundred yards when Golden Hill opened fire followed immediately by a battery of 9.2 guns from the Tiger's Tail forts. The shooting of the Chinese was remarkably good for them if it was their intention to hit the Japs, but, on the other hand, if we were their objective, the ring was excellent. In a few minutes projectiles were falling all around the BALTIMORE and several shots from

Golden Hill almost registered on the Japs. Word was passed for us to get up steam and under way immediately. The 9.2 guns from Tiger Tail worried us. You could hear those shells coming, whining and growing to a mighty roaring crescendo until they seemed right on us, then they would hit uncomfortably near, shooting a column of water into the air that came splashing aboard the BALTIMORE. One shell passed over the ship, just clearing the poop. Everybody below was busy getting up steam while the deck force stood by to up anchor; the rest of us, who were unemployed, had nothing to occupy our minds but apprehension. It's no fun to be in such a precarious and unhealthy situation and be able to do nothing about it. The marine sentry on the poop must have been making four miles an hour between the life buoys that marked the limits of this post and the rest of us were just about as nervous. That marine on the poop was a rangy Texan named Campbell. He certainly had a bad time while we were under fire. Later, I heard one of the men ask him if the shell that just cleared us had come close to him, and he replied with characteristic southwestern drawl and deliberation, 'I don't rightly know how close she come, but she was as big as the State of Texas.' And that was about the way they looked to us who were furnishing the ranging point for that battery. There was no denying the relief we felt when at last we were under way and clear of that unhealthy berth..

It was certainly an anxious time before we got under way and headed out to sea, leaving the Chinks noisily but vainly trying to sink a Jap. I never heard of them scoring a direct hit that day but they were more successful later on, I believe, the Japanese losing two ships in a reconnaissance made shortly before the final attack on Port Arthur.

We steamed back to Chefoo and anchored there. I'm not sure how long we remained but it was about ten days or two weeks later that we again heard that Port Arthur had fallen, and we immediately returned to that port. It was extremely cold and stormy weather and all the way across the Gulf of Pei-chi-li that night we rolled and pitched—it was very uncomfortable. Early the next morning we anchored in our old berth, but this time there was no firing and we soon discovered that Port Arthur had actually changed hands. The Japanese flag was flying over Golden Hill and other forts in place of the Chinese, and many Japanese ships were operating in and outside of the harbor.

Shortly after an early breakfast, Lieutenant Halsey, aide to Admiral Carpenter; Lieutenant Culver, intelligence officer; Lieutenant Simpson and myself were ordered ashore by the Admiral on an observation trip. We set out at once in a whale boat, heading north to the shore and intending to stand close in and then follow the coast to the entrance. We had pulled well in when we say two Jap torpedo-boats clearing the harbor of mines. The Chinese mines were pretty generally defective. Although they had

planted them all over the channel and before the harbor entrance, they had failed to explode when the Japanese destroyers, taking advantage of a heavy rainstorm, made their famous dash past the batteries and reached the inner harbor unhit to join with the land forces in taking the navy yard. This had occurred on the afternoon of the day before we arrived. They say that this dash of the Japanese destroyers added greatly to the demoralization of the Chinese garrison, for once inside the harbor they opened up with machine guns at close range. They swept the streets of the navy yard, putting an end to such resistance as the Chinese were then making.

Well, these Japs were now snagging the mines and using countercharges to detonate them. After each explosion a great column of water would heave up in the air and our whale boat seemed to be lifted out of the sea, the waves would then shake us up and almost capsize us—we were pretty well banged around but somehow survived with nothing more serious than a ducking for all hands. What appeared to be the leader of the two ships so engaged signalled us to stand away and bore down upon us. When she was close aboard we were very much surprised to be hailed with: "Hello there, Halsey!" by a Japanese officer. This chap turned out to be a classmate of Halsey's at the Naval Academy and for a little while they held a real reunion. Well, Halsey told him about our orders and he very courteously offered to tow us into the navy yard, although he stated he could not vouch for the action of the shore authorities when we got there. We readily agreed to take our chances with the Army of Japan since the Navy turned out so accommodating, and he passed up a line. In going in we found just off the navy yard three small Chinese gunboats which were said to have been sunk by high angle fire from a battery landed on the westward slope of a high mountain which crowns a promontory forming the western side of the outer harbor. The firing had been over Tiger's Tail Hill and controlled by observation. High angle fire was at that time something comparatively new and we were very much interested in the results obtained.

Thanks to the kindness of our Japanese naval friend, it was still quite early in the morning when we landed in the navy yard. By that time the fighting was all over, of course, although there was only one lively little scrap off to the eastward near the coast during the morning. It was reported that a Chino mob of defeated soldiers attacked a small body of Japs and got another sound licking. We did not see this row—only heard of it. Everything in the navy yard indicated the military efficiency of its captors and over all there was an atmosphere of restrained rejoicing. The Japanese, while busy in organizing their new acquisition, were tickled to death over the capture of Port Arthur with so small a loss. I believe they admitted to about 40 killed and 300 wounded. The navy yard, its buildings and docks, appeared to be unharmed; the Chinese had abandoned the place in such panic that they had no time for demolition. This, I believe, was partly

accounted for by the dash into the harbor of the Japanese destroyers mentioned before. Their action was most timely as the yard was then crowded with defeated Chinese troops and no doubt they would have destroyed the dock and burned the buildings had they not been put to flight or killed. I was immediately impressed by the fact that I saw no Chinese prisoners around the navy yard and later had occasion to wonder at their absence in other parts of the theater of conflict. The answer, I found, was that the Japanese made no special effort toward the capture of the Chinos, being content to chase them away.

We stood around a minute or two on the dock before we were joined by several Japanese officers, some of whom spoke English, and they took us direct to the old Chinese Admiralty Office. There we were met by the Chief of Staff of General Field Marshal Oyama. He was a very courteous man, one of the tallest Japanese I have ever seen, and possessed with a magnificent suite of whiskers. Further, he spoke excellent English. We told him of our mission and the request made by Admiral Carpenter that we be allowed to view the scene of the fight of the day before. He took our names and disappeared. After an appreciable wait he returned and we were conducted into the room that had previously been occupied by the Chinese admiral. It was very sparsely furnished, the only notable piece of furniture in it being a very handsome high teakwood bunk, beautifully inlaid in shell. On the bunk was a knapsack and a heavy red blanket but no mattress, just the plain boards. General Oyama, to whom we were introduced, had evidently just rolled out from under his blankets to receive us. This was certainly Spartan simplicity for a Field Marshal, but we soon found that he was very much of the campaigner and very little of the titled figurehead. He was an affable man, about 40 years of age, quite stout, who appeared keenly alive to everything about him. He was taken ill shortly after our trip and was succeeded by General Nogi. He expressed himself as gratified at our visit and issued orders to let us look around. We soon learned that our inspection was to be kept well within the limits imposed by military and naval policy—we were not allowed to do much independent roaming. Through his aid we were assigned officers as guides and given our choice as to where we desired to go. Culver, Halsey and Simpson elected to remain in the vicinity of the navy yard, while I asked to be taken out to the lines of the last fighting.

I was introduced to a very stern and forbidding captain of artillery who was detailed to take charge of my trip. He had none of the usual Japanese affability but was severely and formally military. His manner left no doubt in my mind that the job did not appeal to him. While he spoke intelligible English, he volunteered no conversation and during the day such information as I collected was in reluctant response to my questioning. He was stiffly courteous and that was about the best that could be said of him. Although we saw many things that day and were frequently

faced with people in dire want and suffering, he never once seemed to be aware of their existence, but went upon his unwelcome detail as my guide with uncompromising mien, unseeing eye and pronounced reticence.

We left the navy yard mounted on tough, shaggy Chino ponies and rode in a general northeasterly direction toward a line of hills about 2½ or 3 miles out. The country through which we travelled was barren, of grey shale and stone; I saw no verdure, no cultivated spots nor any trees. There appeared to be no improved roads, just broad tracks made by the traffic. In normal times it must have been a desolate, uninviting stretch of country, but now, of course, there was movement all about us. The Japs were everywhere busy taking over; a stream of supplies, carried by long lines of transport coolies, was moving in and hundreds of Chinese refugees were moving out, toting as much of their possessions as they could carry. Along our road I saw Chinese dead, both soldiers and civilians; many of the bodies disemboweled and most of them beheaded. Everywhere small pariah dogs and hogs were feeding upon these corpses; not a pleasant sight by any means. The Chinese that I saw hurrying away from Port Arthur were civilians, many of them wounded and all of them in a pitiful state of fear and apprehension.

We finally ascended Two Dragon Hill—I believe it was so named—and there I saw the Japs burying the Chinese dead. They had dug long, deep trenches and were rolling the Chinese in and there was no attempt at identification of the dead. The descendants of those Chinks would have had a hard time finding the graves of their ancestors. I saw many dead Chinamen, but no prisoners. Certainly there were no Chinese working in the burial details; there were probably some Chinese soldiers captive in the general camp area of the Japanese, but I was not allowed to go there. The Chinese rifle pits which lined the crest of the hills were peculiar. They were simply little wells about 4 feet deep with room for two soldiers in each hole and were spaced about 5 or 6 feet apart. The view from my position was magnificent. The ridge upon which we stood formed the second line of defense, the first line being about a mile to the north where there had been erected a string of small forts or redoubts. This line was practically continuous, west to east, the left on the western slope of a high hill northwest of the dockyard and the extreme right resting on the most eastern coastal fort. There was a gap in the western segment where the main road from the north passed through the hills. Looking towards the south and southeast one saw every detail of the navy yard and the twin harbors, and the value of Port Arthur as a base and refitting station was very apparent. There are but few, if any, such perfectly protected harbors in the world, nor any more susceptible to complete land and water defense. The drawback of the position was that a strong land investment could bottle up the garrison and if the enemy fleet controlled the sea the defenders were in a bad fix. The Russians found this to be true in 1904.

My guide suffered his one loquacious moment during the day when, indicating the gap in the line of hills, he told of a futile counter-attack undertaken by the Chinese during the fight and of how easily the Japanese had broken it up by shrapnel fire. He was almost vivacious in describing the effect of shrapnel on the mass formation of the Chinese. Shrapnel, by the way, was new to the Chinos and very terrifying to them, according to all accounts.

After a thorough survey of this sector of the line my captain indicated that there was nothing further to be seen—a polite way to inform me that I was not to be allowed to go any farther.

Shortly after we started on the return ride we met two Japanese soldiers with their guns slung over their shoulders. Between them they were dragging a bleating, squirming sheep, each firmly grasping a horn. When they saw us bearing down on them they held a hasty conference and seemed to be contemplating flight—there was no doubt in my mind that the sheep was loot—however, there being no place to hide in that barren landscape, they decided to brazen it out. They presented a very comical picture as they strove to preserve their military dignity and render a proper salute, while that fighting ram was dragging them all over the road. While the incident was amusing to me, the captain did not view it in that light; beyond snapping out a few harsh Jap words and perfunctorily returning the salute, he did not deign to notice the men and their struggling captive. I was really thankful for this one bright moment in that depressing ride along this road with its unburied dead and its forlorn living. Most of the Chinese that we passed were of the poorest coolie type and those few of the better class appeared in mortal terror for their lives.

Further along, about a mile from the navy yard gate, I picked out of the constant stream of moving men and animals a very well-dressed Chinaman, a wealthy merchant I would take him to be. He was coming towards us and leading a little boy of about seven years of age. This Chinaman evidently spotted us as officers from a distance and as we drew near he selected me because of my older appearance as the more important. He halted directly before my horse, knelt on the ground and prostrated himself, burying his head in the dust of the road. All the while he chanted some sort of wailing supplication in Chinese. The faces of these two were a study; the man showed intense fear, suffering and physcial exhaustion, and the little child—who was beautifully dressed and evidently of high caste —while bewildered and terribly frightened, was not crying but stood beside his older companion staring up at me in wide-eyed, mute appeal. Suddenly the man tugged at the child's coat and it then followed his example and kneeling in the road buried its little face in the dirt. The scene greatly affected me. That Chinaman was evidently at the end of his string, momentarily expecting violent death and making this last effort to secure pro-

tection for the child. I was to learn later that while his present fears were probably groundless, his counrymen in the little village by the navy yard, from which he likely had come, had been roughly handled and the terror that he had escaped was evidently still upon him. The captain of artillery paid absolutely no attention to them. He had halted when I pulled up my pony to avoid the prostrated Chino and now rigidly sat his mount gazing into the distance; those two pleaders might as well have not been there, so far as he was concerned. I asked him what the Chino wanted. At first he said nothing but when I insisted he barked a few questions at the man, who fairly grovelled before him, and then explained to me that he wanted a pass to safety. I asked my guide to give them the safe conduct and, after demurring and stating it was not necessary, he shrugged his shoulders and, taking out a pad, scribbled some hieroglyphics on it and tore off the sheet, which he tossed to them. The Chinaman clutched the pass and bowing his thanks took the child by the hand and went hurriedly toward the Japanese lines, holding the precious paper before him for all to see. That was the last I saw of the pair, but I have always hoped that my intervention may have saved the life of that man and the little boy. Still, I have had my doubts these many years—I wish I knew what was written on that paper.

When we reached the navy yard on our return I noticed nailed on the big wooden gates several human ears and hands. The captain told me that just prior to the final attack on Port Arthur the Chinese had captured some members of a Japanese cavalry patrol and had brought them in and beheaded them. The gruesome trophies of this lone Chino victory were those displayed on the navy yard gates. I gathered from him that this little pleasantry had not been overlooked when Port Arthur was captured—but as to the manner of reprisal he was silent. Afterwards, I learned that this little fight was one of the most stubbornly contested that occurred during the capture of Port Arthur. Generally, the Chino did not stand but fled before the Japs reached a position—this fight was different. A squadron of cavalry and a company of Japanese infantry held off ten times their number of Chinese from a position commanding the approaches from the north. The fighting was all hand-to-hand and the Japanese displayed the utmost gallantry in the action. They suffered many casualties and six or eight of them were captured when by sheer weight of numbers the Chinese penetrated their position.

My guide returned me to the admiralty building and abruptly took his departure. I saw no more of him. He still ranks "number one" of hard-boiled people I've met.

Left to my own devices I hunted for and found the house set aside for the newspaper correspondents. There I met Mr. Villers, who was a very interesting character. He was an old campaigner and looked every inch the part; rugged, weather-beaten and adaptable to any mode of living.

All of us probably well remember his fine work as a field artist for the London Illustrated News. Mr. Creelman, who was then, I believe, with the New York World, was also in the room. In contrast to Mr. Villers he seemed violently excited and suffering from a bad cold. According to his version there had been a fight in the village outside the navy yard when the Japs swept in and a number of civilians had been slaughtered. This news he wanted to send to his paper but he couldn't get it passed by the authorities and in consequence he was furious and unguarded in his remarks about the Japs. Villers endeavored to calm him because, as he pointed out, the two Jap boys who were in the room preparing supper understood English and undoubtedly would report every word he said. This might well lead to difficulties and possible restrictions on the movements of all correspondents and interfere with news-gathering. I stayed and shared their supper—rice boiled in muddy water and a cup of tea.

Mr. Creelman's talk led me to walk out to see the village. It was just outside the navy yard gates—where the ears and hands of the Japanese prisoners of war were nailed—and was just one long street of small dwellings and shops. The place looked like a cyclone had struck it and there were numbers of dead still lying about. There had been a terrible fight in that little street—one in which the sword had played a prominent part, judging from the bodies I inspected. I wondered if this was the reprisal for the treatment accorded Japanese captives—maybe it was.

During my trip to the fighting lines I noticed certain officers in the Transport Corps of the Japanese. By questioning my taciturn guide I found out a rather interesting thing. There were a number of young bloods, the sons of the Samurii of Japan—the old fighting caste—who were attached to the Transport Corps of the Japanese. When the war with China broke out these young men immediately offered their services but not being trained officers the military authorities refused to use them with combat troops. However, they were made "captains of hundreds" and placed in charge of transport coolies. They wore the regular Japanese uniform with the exception that on one shoulder—the right, I think—was a scarlet slash or streak resembling lightning. Each of these young men had brought with him from Japan the hereditary sword of his family—the divine steel of Nippon. The handsome lacquered cases and ornate hilts which are usually seen with these Samurii swords had been removed and replaced by plain wooden hand-grips and scabbards. In marching, these officers used the encased sword very much like a walking stick and it was this fact that first attracted my attention to them.

During my talk with the newspaper correspondents I got the answer to the puzzling absence of Chino captive soldiers. As the Japs swept through the first and second lines of defense, the Chinos found themselves with their backs to the sea, without transports to take them off. The remnant

of the Chinese army had swung to the eastward. There had been no effort made to bottle them up, but they were allowed to move around the Japanese left flank along the coast, although some did escape in junks. All the Japanese wanted at that time was Port Arthur and they did not desire to be burdened with the care and feeding of a great number of prisoners.

When I first came into the navy yard the place had been pretty well filled with Japanese soldiers. There was a great deal of rejoicing and general excitement but no vandalism that I saw. The provost guard got busy during the afternoon and cleared out all those not actually on duty before our visit was over.

About sunset, having seen all we were intended to see, and some things beside, we bid our hosts goodbye and left, arriving aboard the BALTIMORE without incident sometime after dark.

Much has been written about this capture of Port Arthur and the ridiculously small cost in men and material to the Japs to acquire so priceless a naval base, but to me my visit is memorable chiefly because of the hope that still lingers that I was instrumental in saving two lives at a time when, due to the excitement following victory, a Chino life was about the value of a lead yen, and for my encounter with this hard-boiled captain."

COMBAT OPERATIONS IN NICARAGUA

Compiled by DIVISION OF OPERATIONS AND TRAINING

Orientation: In the June issue of the GAZETTE, the operations resulting in the seizure of the bandit stronghold, "EL CHIPOTE," were presented. The final phase of these operations occurred during the last week of January, 1928. As a result of these operations, the concentration of the outlaw force was broken up and their principal base was destroyed. A considerable number of the outlaws still remained at large, however, and were still active. The problem became one of pursuing and destroying the small scattered groups of outlaws that remained in the field.

Report of Commanding General for Period January 15th to February 27, 1928

Brigadier General Logan Feland assumed command of the Brigade January 16, 1928. The following outline of the situation is quoted from his report to the Major General Commandant covering the period from January 17th to February 27th:

"I have divided those parts of Nicaragua occupied by this command into areas as follows:

NORTHERN AREA—All of western Nicaragua north of the general line: SOMOTILLO (exclusive)—ACHUAPA-ESTELI (both inclusive) —JINOTEGA (exclusive). This area is now commanded by Colonel R. H. Dunlap (C. O. 11th Regiment) with headquarters in OCOTAL.

SOUTHERN AREA—All of western Nicaragua south of the general line: SOMOTILLO (inclusive) — ACHUAPA-ESTELI (both exclusive)—JINOTEGA (inclusive). This area is now commanded by Colonel R. R. Wallace (C. O., 5th Regiment) with headquarters in MANAGUA.

"EASTERN AREA—The east coast of Nicaragua and such Nicaraguan territory inland as can be controlled by troops supplied from the east coast of Nicaragua. This area is now commanded by Major H. H. Utley, with headquarters at PUERTO CABEZAS.

"During the latter part of January, troops based on SAN ALBINO ascended and thoroughly combed "EL CHIPOTE." During the same period these troops repeatedly patrolled, and by frequent contacts kept outlaws on the move in the area: SAN ALBINO-TELPANECA-QUILALI.

"During the latter part of January a detachment pushed intensive reconnaissance to the east of MATAGALPA.

"During the early part of February it became apparent that outlaws were congregating in the vicinity of TERRERO GRANDE. This area was promptly and aggressively reconnoitered with the result that outlaws have not since been reported there.

"YALI and SAN RAFAEL DEL NORTE, two towns which have been favorite places of Sandino, were occupied by detachments on February 6th and 7th, respectively. There is now a detachment of fifty men at each of these places.

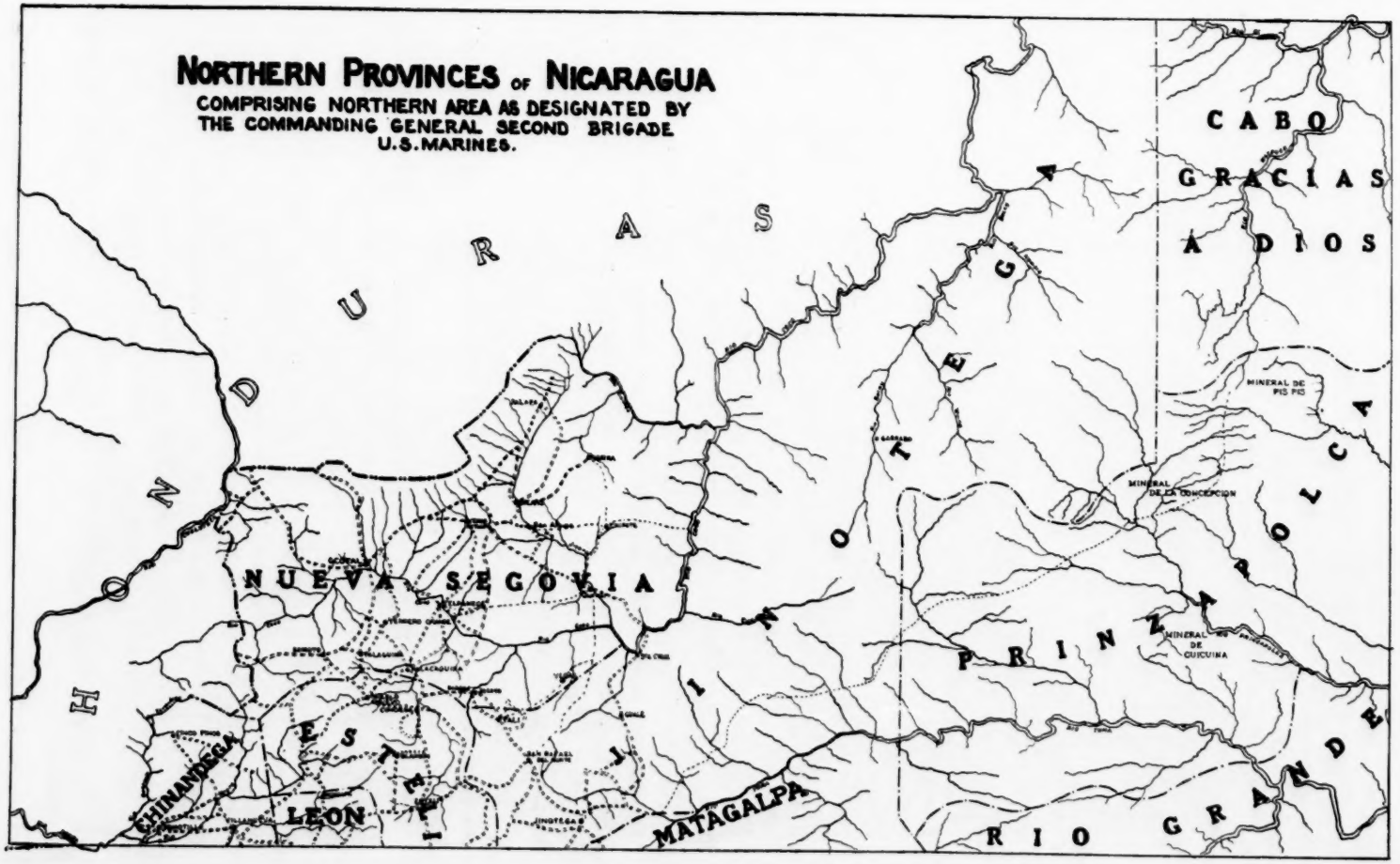
"About February 7, 1928, it became apparent that Sandino and some of his followers were in the coffee district in the vicinity of MATAGALPA and JINOTEGA. Repeated information from native sources indicated that it was Sandino's intention to attack JINOTEGA. There are several American and other foreign planters in this coffee district and, from the nature of the case, it was essential that this area be made secure from depredations by outlaws. Lieutenant Colonel Berry, with the forward echelon of the 5th Regiment, was promptly established at MATAGALPA and there was organized at that place an active intelligence service with the valuable assistance of American and other foreign residents. By marches and motor transport movements, the strength at MATAGALPA and JINOTEGA was increased to over 450 officers and men. Major Rockey, with over 200 men (170 of whom were mounted) from MATAGALPA and JINOTEGA, has carefully reconnoitered this district without contact with outlaws, but with the certain result that no sizable band remains herein.

"All detachments have pressed active patrolling with the result that outlaws have been kept constantly on the move, denied towns of any importance and permitted no rest.

"Orders were issued February 27th for Major Rockey's command (operating out of MATAGALPA and JINOTEGA) to reconnoiter and seek contact with outlaws in the area north of JINOTEGA between the JINOTEGA-GUALI-STA CRUZ road and the JINOTEGA-SAN RAFAEL DEL NORTE-YALI road, as far north as the RIO COCO; then for Major Rockey with Headquarters and Headquarters Company, 1st Battalion, 11th Regiment, and with one Rifle Company of same battalion (all mounted) to continue northward from the RIO COCO with QUILALI as their destination. This force will remain in the Northern Area.

"Outlaw groups will not withstand an attack. Upon the approach of a column of Marines, they will remain in a position only when it is an ideal ambush of their own choosing with a good avenue of escape to their rear. A detachment of Marines as small as a platoon, when moving during the daytime, becomes a column in this country. As such, it cannot hope to obtain surprise without which contact will not be gained.

"Instructions have been issued to Area Commanders enjoining the em-


NORTHERN PROVINCES OF NICARAGUA
COMPRISING NORTHERN AREA AS DESIGNATED BY
THE COMMANDING GENERAL SECOND BRIGADE
U.S. MARINES.
HONDURAS
NUEVA SEGOVIA
ESTELI
CHINANDEGA
LEON
MATAGALPA
JINOTEGA
NORTE
CABO GRACIAS A DIOS
MINERAL DE PIS PIS
MINERAL DE LA CONCEPCION
PRINZAPOLCA
MINERAL DE CUICUINA
RIO GRANDE

ployment of heavily armed patrols moving secretly at night and resorting to ambush in order to obtain surprise against outlaws during the *daytime*. This method is now being employed in the Northern Area where operations against outlaws are almost exclusively confined. I believe that this tactical method will result in many casualties among the outlaws, with a minimum of casualties suffered by our troops, or will compel outlaws to leave areas covered by patrols thus conducted."

Contacts During Period January 15th to April 18th.

In a report subsequent to the one above quoted, the Commanding General stated:

> "For the period mentioned (January 15th to April 18th, inclusive) there have been twenty-eight (28) contacts by ground troops with armed outlaws. In determining this figure 28 the conduct of two detachments, each of which had several small affairs, are counted as only two contacts."

In the same report he noted three principal contacts:

(a) On February 28, 1928, an empty pack train, commanded by Lt. Edward F. O'Day, was ambushed near the DARAILI RANCH (vicinity of JOCOTO on Ham map) by about 200 outlaws, armed and having machine guns. Five marines were killed and eight marines were wounded.

(b) On March 19th, near MURRA, our planes made contact with about 100 outlaws who had at least one machine gun. The planes made three successive contacts that day; the planes were hit several times. Captain Francis E. Pierce, U. S. M. C., Observer, was wounded (shot through the foot) during the first contact by the planes.

(c) On March 31st, about twelve miles northwest of BLANDON, a patrol attacked and completely routed a marching outlaw group of about 75 men. No marine casualties.

Reports made in connection with the two contacts first mentioned follow. The report of the contact on March 31st will be published in a subsequent issue.

ATTACK ON O'DAY'S COLUMN—LIEUTENANT O'DAY'S REPORT.

Headquarters, 2d Battalion, 11th Regiment,
Condega, Nicaragua, 1 March, 1928.

From: 1st Lt. Edward F. O'Day, U. S. Marine Corps.
To: The Battalion Commander, 2d Battalion, 11th Regiment.
Subject: Report of Engagement with Bandit Forces.

1. The following report of a skirmish with bandit forces is herewith submitted:

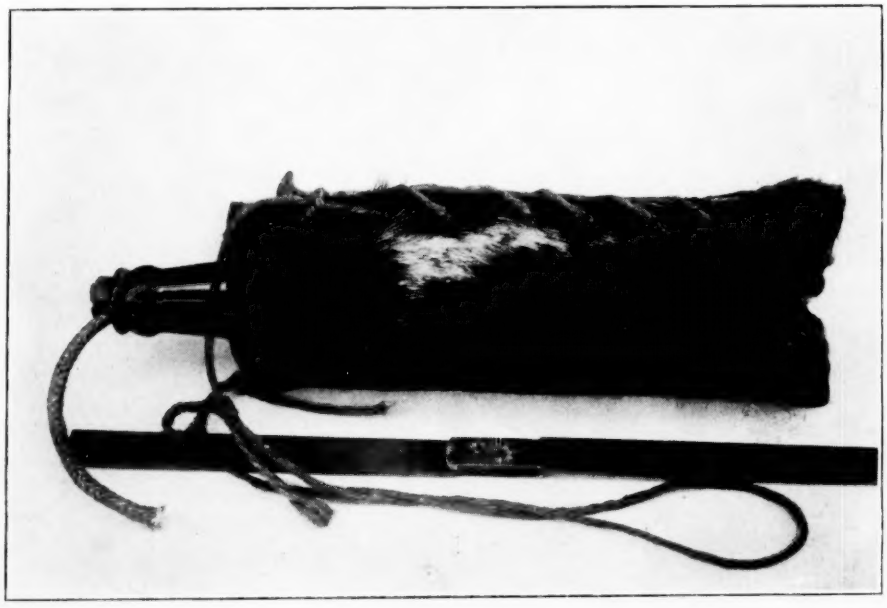
On 27 February, 1928, the ration train under my command that left

Brigadier General Logan Feland, U. S. M. C., at Headquarters, Second Brigade, Managua, Nicaragua

Airplane View of Jinotega, Nicaragua

Marine Patrol with Pack Train

Planes over Volcano Monotombo



Beer Bottle Dynamite Bomb Used by Nicaraguan Outlaws

ESTELI on 23 February, 1928, and proceeded to SAN RAFAEL and YALI with commissary stores, cleared YALI at 8:15 a. m. on 27 February, 1928, all stores having been delivered. The column consisted of one officer, 35 Marines, 1 Pharmacist's Mate 3c, U. S. Navy, 20 muleros and 2 "jefe" muleros with 95 mules, and was proceeding along the trail between YALI and CONDEGA. At approximately one-half the distance between the two towns, the column was ambushed by the bandit forces. The exact location of the skirmish is about 1,000 yards west of a town named BROMADEROS.

2. The column had just been closed up and was proceeding west, and as it entered the flat space of ground between two ranges of hills the bandit forces opened fire on the right flank of the column throughout its entire length, also from the front and rear of the column.

3. The firing commenced at approximately 1:30 p. m., and lasted until 8:30 p. m. the same date, when it subsided to irregular harassing fire throughout the night. It is estimated beyond doubt that the bandit forces had a minimum of four machine guns, at least 600 rifles, and a large quantity of dynamite bombs. At least 200 dynamite bombs were discharged.

4. The bandit forces withheld fire until the entire column was in front of them, varying in distance from 75 to 200 yards along the trail. The first shot of the skirmish was directed at the undersigned and was immediately followed by simultaneous firing along their entire line, opening up with everything that they may have had. The mule train was stampeded upon the initial burst of fire along the line. The Marines eased off to the brush on their left and commenced firing. Being outnumbered to such an extent, and the bandit forces having fire superiority, the Marines moved to the left gradually, taking position on a ridge. The bandit forces continued incessant fire until about 2:30 p. m., when they advanced towards the Marines in line of skirmish, the machine guns keeping up fire on the Marines' positions, in addition to rifle fire. After advancing to the foot of the hill, the bandit forces fell back at about 3:00 p. m., leaving in the vicinity several groups of their men. As they fell back to their positions they ravaged what could be found on the train. At about 6:30 p. m. they again moved forward in skirmish formation and proceeded to the base of the hill. This advance was also broken up and stopped by Marine fire. The bandit forces kept firing during the entire time until about 8:30 p. m. They were evidently well supplied with ammunition, as one or more machine guns were firing practically all of the time in addition to rifle fire and bombs. During the night there was a great deal of movement of bandit troops and what sounded like bull carts and a mule train. The Marines maintained the position occupied until daybreak when reenforcements from the 57th Company, under command of Captain William K. MacNulty, U. S. M. C., arrived on the scene. The attack on the bandit forces was then taken up.

5. Three Marines were killed in action on 27 February, 1928. Two

more died the following day from wounds received in action on 27 February. There were eight men wounded. Four of the 20 muleros with the column were wounded by rifle fire, two of them leaving the vicinity for ESTELI at dusk, one going to CONDEGA. The other, being wounded in the groin, remained with the Marines.

6. On the morning of 28 February, 1928, after the attack upon the enemy emplacements, the three dead Marines were collected and interred near the village of BROMADEROS under the supervision of Captain MacNulty. Such equipment and effects as were found were returned to CONDEGA. The bandits killed and wounded in the skirmish were taken to their rear and it is impossible to ascertain the number or to form an estimate, although there were many evidences of bandits having been wounded and evacuated.

7. The two Marines that died on 28 February, 1928, were interred at DARAILI. Existing instructions pertaining to deceased Marines were complied with to the best extent practicable.

8. Two or more of the bandit forces could speak irregular English and made a specialty of harrassing the Marines with slurs and insults during any lull in firing. All the bandit troops that came in sight of the undersigned were outfitted with shoes.

9. At about 7:30 p. m., their fire was lulled and someone with a tenor voice complimented the bandits for their work. This was repeated in loud tones all along the line. The message as heard seemed to be: "Complimentado todos soldados por trabajo bueno." Upon the message being repeated, three tremendous cheers were given, interspersed each time with the detonation of from six to ten bombs. The cheer was "Vive la Sandino; vive las Nicaraguans."

10. Immediately following this cheer, three more were given for some General whose name I could not understand but it sounded as though it had three syllables.

11. Shortly after 8:30 p. m., some of the bandit troops started to leave. This was the signal for more cheers. Some that were understood were "Bueno Concordia, Adios Condega, Adios Jinotega,"—apparently detachments from those vicinities.

12. Approximately one-third of the horses and mules in the column were killed, wounded, or captured by the bandit forces.

13. The Marine dead were whacked over the head with bolos by the bandit skirmishers, splitting their skulls wide open.

EDWARD F. O'DAY.

Captain MacNulty's Report

57th Company, 2d Battalion, 11th Regiment,
Condega, Nicaragua, 5 March, 1928.

From: Captain William K. MacNulty, U. S. Marine Corps.
To: The Commanding Officer, 2d Battalion, 11th Regiment.
Subject: Report of Action, Patrol of 57th Company, Commanded by Captain William K. MacNulty, U. S. Marine Corps.

1. In compliance with orders from Battalion Commander, 2d Battalion, 11th Regiment, dated 27 February, 1928, I cleared CONDEGA at 5:34 p .m., 27 February, 1928, with two commissioned officers, one warrant officer and 85 enlisted marines and one hospital corpsman, enroute to YALI and VEGAS via DARAILI, to investigate and suppress any bandit activities at those places.

2. At 10:30 p. m., 27 February, 1928, the column was halted by Corporal Homer T. Provost about four miles from Daraili, who reported that Lieutenant O'Day's column had been ambushed about three miles the other side of DARAILI and that he made a getaway to report to CONDEGA. (Corporal Provost is in the Intelligence Section, 2d Battalion.) I proceeded to DARAILI, where the mule train and all extra equipment were left under guard.

3. Mr. Gonzales at DARAILI was questioned and stated that he had heard firing between 1:00 p. m. and 8:00 p. m. but did not know anything about what was going on. A patrol was dispatched to CONDEGA with this information for the Battalion Commander.

4. At 12:45 a. m., 28 February, 1928, the column left DARAILI for Lieutenant O'Day's relief. After marching one and one-half hours, I decided that we were nearly up to the place of ambush. No firing had been heard and only a few native yells. As soon as it was light enough, a reconnaissance was made and it was found that we were about 500 yards from the place. Moving forward, our point entered an open space. I had gone forward at this time and we saw two pack mules, one packed with what looked like ammunition, running toward the hill on our left front. I called to Marine Gunner Allen to shoot it, which he did. At the same time I halted the column in the brush and got the point under cover. At this place we found a marine hat and some equipment (sketching board and map case).

5. Shortly after the shots had been fired at the mules, I heard Lieutenant O'Day call from the brush on the right of the trail asking "Who is there?" I answered "Captain MacNulty with 57th Company." Lieutenant O'Day then came up through the brush alone and joined the Company, giving me the approximate location of bandit positions, and stating that his column was badly scattered.

6. I gave Marine Gunner Allen instructions to get his machine gun in a position where he could sweep the crest of the hill on our left front and formed my company along the trail, Lieutenant Chappell on the left, Lieutenant O'Day on the right, myself in the center. We started to ad-

vance at 6:45 a. m., moving off to the northeast, making a turning movement to the right and advancing due east, striking the bandits on the right flank (see Intelligence Section sketch). They opened fire at about 2:12 a. m., which was returned. The advance was continued by short rushes, the machine gun covering the ridge ahead of us as we advanced. The gunner, having a good view of the crest of the hill, gave us excellent position fire with very little danger to our line.

7. Our advance continued until 8:20 a. m., when the last bandits were cleared out of the vicinity.

8. It is estimated that on the morning of 28 February approximately 200 bandits were in position, and a conservative estimate of their casualties would be 10 dead and 30 wounded. Seven dead horses were counted on the hill after the attack. There were no marine casualties during the attack of February 28, 1928.

9. It is believed by the undersigned that the attack on the morning of February 28, 1928, was a surprise to the bandits. They were waiting until daylight to complete the destruction of Lieutenant O'Day's organization and had no information that reenforcements had arrived. When our automatic weapons started firing, there was a surprised yell all along their line.

10. The troops were withdrawn at about 9:30 a. m., and outposts established. In assembling Lieutenant O'Day's patrol, it was found that he had three dead and 10 wounded. The dead were buried, Brigade Order No. 28 of 1 March, 1927, being complied with as nearly as possible. Stretchers were improvised and preparations made to return to DARAILI with the wounded. At about 12:10 p. m. an aeroplane sighted us and reports of casualties were made.

11. The column left BROMADEROS at 1:00 p. m., and arrived at DARAILI at 2:10 p. m., where the Battalion Commander was waiting.

12. The entire command conducted themselves in the most soldierly manner during the attack of 28 February. Most of the Company were recruits with less than four months' training, yet they responded instantly to orders and the line never faltered in its advance.

W. K. MacNulty.

Resume of Air Operations against Hostile Outlaws in Vicinity of Murra 18th, 19th and 20th, March, 1928.

18 MARCH, 1928

1120—The leader of a two-plane air patrol heard two distinct shots fired while reconnoitering at low altitude about two miles south of MURRA. Machine gun fire was directed into the underbrush but the enemy was not developed. The houses in the area about MURRA had a suspicious appearance.

1250—The patrol landed at MANAGUA and found that the plane flown by Lieutenant Lamson-Scribner had been hit twice. One bullet punctured the tail of a bomb and the other passed through the right wing. Immediate report of outlaw group two miles south of MURRA was made by telephone to Brigade Headquarters with a request for transmission of same by radio to Area Commander, OCOTAL.

19 MARCH, 1928

1210—A two-plane patrol encountered hostile fire at a house one-half mile northeast of MURRA. Enemy was engaged with bombs and machine gun fire. A few minutes later, fire was encountered from at least three more groups about two miles south of MURRA. Enemy was again engaged at this place. At this time Captain Pierce, the chief observer, was shot through the left foot, and as he became weak from loss of blood, the engagement was broken off and the patrol went to OCOTAL to evacuate him. Private Murphy, a member of the OCOTAL garrison, volunteered to take the place vacated by Captain Pierce, and the patrol returned to MURRA.

1345—Hostile fire was again encountered from eight different groups in the vicinity of MURRA. All groups were engaged by the planes, using both machine guns and bombs.

1410—Broke off engagement after expending all ammunition and bombs.

1420—Reported enemy location to Commanding Officer, SAN ALBINO.

1430—Report of engagement received at MANAGUA via transport plane pilot. Immediately dispatched additional plane to reenforce patrol at MURRA, and sent another plane with an aircraft armorer to OCOTAL.

1530—Two planes returned to MANAGUA from MURRA sector and reported events. Both planes were serviced and immediately sent back to that area.

1620—The single plane sent to join the patrol arrived at MURRA. A group of outlaws was found three miles north of MURRA and immediately engaged. All ammunition was expended, and attack broken off.

1655—The single plane landed at OCOTAL.

1715—The two-plane patrol again arrived and found outlaws gathering horses and loading pack trains preparatory to marching. Three groups were again attacked, as well as a pack train. Hostile fire was again encountered but was beaten down by the bombing attacks. The attack was broken off on account of darkness, and the planes returned to OCOTAL.

20 MARCH, 1928

Another plane joined the flight at OCOTAL, and the MURRA area was carefully patrolled. No outlaw groups could be located. At about 10:45

the ground troops from JICARO arrived at MURRA. The area north of MURRA appeared normal, but south there were some outlaw signs.

General: The outlaws had at least one machine gun, probably two; were equipped with high-powered 30-30 rifles and were plentifully supplied with ammunition. They had a large number of horses, several small herds of cattle, and at least one pack train.

They were scattered over an area approximately two miles wide by four miles long (north and south of MURRA). The estimated number of armed men present, including at least eight groups, is 150. They displayed an aggressiveness and a willingness to expend ammunition beyond the ordinary. They fought with greater tenacity than was usual.

It is impossible to estimate the casualties inflicted on the enemy, due to the heavy underbrush. Their losses were no doubt considerable, as numerous direct hits were made with bombs and a large volume of machine gun fire was well placed. Four or five dead horses and mules were seen. Large numbers of vultures were observed the following day about the places where contacts had been made.

The planes expended about 4,000 rounds of ammunition and 50 bombs during the operations.

During the action one officer was wounded and the planes were hit 12 times by hostile fire. One bomb was struck and a flying wire was shot away on Chief Gunner Wodarczyk's plane. The rest of the hits did no great damage.

The major part of the credit for the engagement belongs to Chief Marine Gunner Wodarczyk, the leader of the two-plane patrol. He and Captain Pierce, his observer, discovered the enemy, and thereafter Mr. Wodarczyk conducted the attacks with skill and courage. Captain Pierce displayed great courage and kept his gun in action until he could no longer stand the pain and loss of blood. Private Murphy, who had never been in an airplane before, deserves commendation for going into the air fight voluntarily, although not a member of the Aircraft Squadrons.

AIRCRAFT IN BUSH WARFARE

By MAJOR ROSS E. ROWELL, U. S. MARINE CORPS

1. INTRODUCTORY. Since the close of the World War, air forces have been employed in bush, or guerrilla warefare on several occasions; notably by the British in Mesopotamia and in Irak, by the Italians in Tripoli and by the French and the Spanish in Morocco. The aerial operations of those nations met with varying degrees of success. Probably no broader experience has been gained, or greater success achieved through the employment of aircraft in minor warfare, than that which attended the operations of our own Marines during the Nicaraguan campaign of 1927 and 1928. During that period extensive air operations, both independently and in cooperation with ground troops, were conducted against the outlaw groups led by Augustino Sandino. The treatment of this subject, therefore, is based primarily on the experience gained by American air squadrons for the reasons: that authentic data are available, the information has been obtained in active campaign and the Nicaraguan situation provides a case that is fairly typical of bush warfare.

2. INFLUENCE OF THE SITUATION. The situation that will ordinarily exist in a bush campaign is so radically different from that of a major war that the manner of conducting air operations will vary to approximately the same degree.

a. The Enemy. The modern bandit, outlaw or insurgent may be a white man, but more frequently he will be of the red, black or brown races, or still more likely, a mixture. His fighting qualities vary widely, but his morale is apt to be less sensitive to casualties than is our own and he is frequently callous to cold steel and blood. While our troops are greatly superior to him in open terrain, this advantage is reduced to a marked degree when the guerrilla is encountered in his native jungle or mountain areas. He no longer fights with the weapons of aborigines, but is equipped with modern high power rifles, automatic and sub-caliber weapons, repeating shot guns, machine guns and even hand grenades. Ordinarily he will not possess field guns or antiaircraft mounts for his machine guns. Nevertheless, he is very clever in improvising methods of directing automatic gun and rifle fire against airplanes. In Nicaragua, the bandits had several methods of using Lewis machine guns against aircraft from positions on the ground as well as from tree tops specially prepared for the purpose. Contact with outlaw groups is particularly difficult to gain by our ground troops because of the superior mobility of the enemy, who travels light and lives off the country, and because he has better means of securing information. He employs the tactics of swift concentrations, striking a blow from ambush with superior numbers and then beating a quick retreat.

b. Theater of Operations. This factor is one of major importance. The distances required to be covered in operations of both ground and air forces will always be great. Communications facilities are generally the worst conceivable. Telegraph and telephone lines may be cut at the pleasure of the enemy, requiring dependence upon field radio sets and aircraft. Roads and trails are consistently bad, and frequently impassable during certain seasons of the year. Areas occupied by the enemy may be such that fresh foodstuffs, fuel, forage and even potable water are scarce and difficult for our forces to obtain. The climate is often trying and local diseases, insects, vermin, reptiles, etc., frequently combine to greatly increase the normal hardships of campaign. Operations are usually conducted in a country where a foreign language is spoken. This greatly hampers problems of local supply and interferes with intelligence work.

c. National Policy. In minor warfare our national security is not apt to be menaced. The influence of our own administration, expressed through the heads of the State, War and Navy Departments has an important effect on the conduct of operations. The local representatives of the Diplomatic Corps is often involved in the situation and sometimes a high commissioner appears as the personal envoy of the President. Powerful politicians and the representatives of various societies undertake to influence the conduct of affairs. Public opinion, always to be respected, is sensitive to bloodshed and the newspapers are prone to publish rumors of scandals or abuses. Various combinations of these influences not only worry and harass the field commander, but they tend to reduce the fighting morale of the entire command. It is hard for troops to suffer the hardships and to make the sacrifices of war if they do not feel that they have the moral support and full sympathy of their own people. The practical effects of these influences are numerous. For example: we may not bomb towns because it would not be consistent with a policy advocated at some international convention. The result is that all jungle villages become safety zones for the enemy. The safety of noncombatants becomes a matter of prime importance. The bandits then employ screens of women to obtain immunity against air attacks. The use of chemicals, even tear gas, is prohibited for the reason that it might cause our international viewpoint on this subject to be misunderstood. Probably we shall be obliged to take a purely defensive attitude until the enemy has actually inflicted casualties upon us and the situation has gotten entirely out of hand, before we may be permitted to take the offensive. We are required to conform to all of the rules of civilized warfare, while the enemy will torture prisoners, murder the wounded and mutilate the dead. Often legal obstacles will be interposed to prevent the application of military law to properly control unfriendly civilian elements. These are only a few of the difficulties to be encountered, none of which are by any means imaginary.

d. Our Forces. Our forces will be widely dispersed over a large territory, operating from interior bases with rather small columns consisting largely of mounted troops. Field artillery will seldom be required. The zone of action will be districted and troop commanders will operate entirely under letters of instruction. The adaption of local facilities will often be necessary to solve the perplexing difficulties of transportation and supply. Numerous examples of such adaptions may be cited; such as the British Camel Corps, the native "cargador" pack trains used by our troops in the Philippines, the bull cart trains used in the vicinity of Manila in 1899, and the native-mule-mounted infantry used by the Marines in Nicaragua. Altogether, the conditions will be such as to make the emplyoment of aircraft a measure of peculiar importance and value. As previously stated, this employment is carried out along lines considerably at variance with those normally contemplated.

3. Expeditionary Movements. The transportation of air squadrons to the theater of operations is a problem that requires careful planning and skillful execution. The bulk, weight and fragile character of many elements of the equipment require the close attention of experienced personnel. The situation may require that the movement be made by rail, by sea or under its own power. It may be made by a combination of two, or by all three of those methods of transportation.

a. Overseas Movements. The simple and most satisfactory method of transporting airplanes on vessels of the cargo type is to remove the wings, control surfaces and propellers. The fuselages should be wrapped in some water-proof material to protect them from salt water spray and the exposed metal parts covered with grease. The fuselages may then be hoisted aboard and lashed down on the open deck spaces. The wings and control surfaces can be lightly crated. Planes that are not accompanied by their crews should be boxed in the usual commercial manner. Wheeled vehicles are usually carried on deck in the same manner. Heavy units, such as machine shop trucks, should be lightened as much as possible by the removal of tools, repair material and parts that may be readily detached. Other material is carried in specially prepared cases or simply boxed securely. Gasoline and oil is usually carried in drums, but a small amount for emergency use should be taken in five gallon tins. Even though subsequent deliveries of aviation fuel are to be made in bulk or large tanks, the initial supply should be carried in drums in order that containers for local handling may be available. Under certain conditions it may be desirable to transport air squadrons overseas on Naval carriers. In such case the planes are carried set-up on the flying deck. No special training or equipment is required for launching the planes upon arrival at the destination. It is essential, of course, that a protected landing field be available for landing the planes on shore. If airplanes destined for overseas transportation are not equipped with lugs

for hoisting on the center sections, they should be provided with slings designed for that purpose. If the vessel is able to dock upon reaching its destination the debarkation is comparatively simple. If the landing must be made from an anchorage in the open sea, the problem is much more difficult. However, planes can be landed with motor boats of the Naval type, but the kind known as "Beetle boats" are the most satisfactory. If lighters are available, they can also be used satisfactorily. An air squadron that is well trained and properly prepared should be able to embark in about forty-eight hours. In order to do so, however, careful preparation and coordination by the engineering and supply officers is essential. Not less than three months supplies should be carried. Fifty per-centage of spares and one hundred per-centage of engine replacements are necessary. The assembly and preparation for shipment of supplies is the greatest task to be performed and the maximum of forethought is vital to the success of the operations. In providing equipment for expeditions the complete lack of the more common facilities in the field must be contemplated. Such articles as the following are apt to prove indispensable: Portable electric generating plant, flood lights, portable crane, power driven water pump, light tractor, extra water carts, mowing machine, etc. Lists of supplies and equipment must be prepared in advance of the emergency and kept up-to-date at all times.

b. Rail Movements. Aircraft will ordinarily be flown to the vicinity of the embarkation point. It may be found impracticable to assemble the planes and fly them from the immediate point of debarkation. In such case they can be carried on flat cars (gondolas) in the same manner as described for carrying them on the decks of ships. During such trips the lashings must be frequently inspected and tightened as they work loose. The same rule applies to motor vehicles. Care must be taken that all equipment will clear the overhead space limited by tunnels and bridges. Otherwise, rail transportation offers no difficulties.

c. Truck Movements. Movements by truck require no special comment except that the number of vehicles normally allotted to an air squadron is not sufficient to transport the organization in one trip, even though the aircraft be flown. Either repeated trips must be made, or vehicles provided by some other organization.

d. Ferrying. Whenever the situation permits, aircraft should be flown to the destination. With competent flying personnel the hazard of damage en route is reduced, time is saved, the aircraft arrive at the destination fully equipped and ready to operate and the experience gained on the flight will benefit the personnel.

e. Supply. Rations, clothing, fuel for cooking and similar items should be provided by the ground organization as directed by the Field Commander. Such expendable materials as gasoline and oils, should be obtained by au-

tomatic shipments. Aera supplies and replacements will be furnished on special and regular requisitions. Funds to cover local or emergency purchases should be available. New and overhauled engines will ordinarily be obtained in the same manner as other aero supplies, but under stabilized conditions minor, or top overhaul may be performed in the field.

4. Advanced Air Bases. Air bases will usually be limited to operating airdromes and advanced landing fields. Under certain conditions it may be found desirable to establish an air depot in a rear area.

a. Airdromes. The base, or operating airdrome should be as near as possible to a railroad, and a spur should be built to it whenever practicable. It should be located as near to the command post of the Field Commander as practicable. The more it is possible to eliminate trucking, the more will operations be facilitated. Practically all of the activities of an air squadron can be conducted under canvass if necessary, but certain ones, such as fabric and dope work, work requiring electrical appliances, etc., are greatly handicapped. The use of permanent buildings whenever possible will greatly improve the efficiency of the organization. In selecting the airdrome it is important to see that a road suitable for all weather trucking is available. The distance to the nearest source of supply is an important consideration. Gasoline in open storage should be arranged in small sections, segregated, and drainage arranged so that a fire in one section will be confined therein. Bombs and explosives should be similarly disposed in covered pits. The pits should be as convenient to the operating line as possible without exposing any equipment to danger in case of an explosion in the storage area. Great care is necessary to prevent the deterioration of spares under field storage conditions. The wire line to the next higher message contour should be installed and maintained by the higher organization. If this work is done by the air personnel it will require the duplication of facilities that already exist and will impose an additional and unnecessary burden on the air organization. The communications section of the air organization should be authorized to maintain radio schedules with all radio-equipped ground units in the field. Such communication should be strictly limited to airplane movement reports, calls for emergency air ambulance service and such other emergencies as enemy attacks, crashes, etc.

b. Advanced Landing Fields. In disposing their troops all ground troop commanders will give great consideration to the proximity of a suitable landing field. In the Nicaraguan campaign there were several instances where the existence of a landing field was the sole consideration in establishing a post. All ground troop officers should receive special training in the selection of landing fields. In the zone of action as many landing fields as practicable should be surveyed and marked. Many of these fields will only be used for emergency purposes and will have no special facilities. Certain ones situated in key positions should be equipped for advanced air

operations. Such fields will, preferably, be located near the command posts of the larger units. They will have storage facilities for a limited supply of gasoline, oil, bombs, machine gun ammunition and a very few of the more commonly used spares. Such supplies will usually be kept at the prescribed level by air transport. A field telephone line will be laid to the nearest command post. A small detachment from the nearest ground organization should be permanently stationed at the field for guard and maintenance duties. If this detail is not frequently changed, the men will readily acquire the necessary experience to enable them to assist intelligently in the ground handling and servicing of the planes. It is often possible to utilize accidents of the surrounding terrain to secure protection for the planes from the weather or possibly enemy attacks. If the field is exposed to enemy raids, landings will only be made in the presence of ground troops. The ground troop commander will make a reconnaissance, deploy his command and then signal the plane down with his panels. The pilot and observer should assist in the reconnaissance and, if there is a threat of an enemy attack, the plane will be promptly taxied to a suitable take-off position and the engine kept running. In Nicaragua planes took off under fire on several occasions. Patrol and flight leaders will frequently be given their missions by the advanced ground troop commanders at these landing fields.

c. Defensive Measures. In addition to the precautions necessary at advanced landing fields, mentioned in the preceding paragraph, some defensive measures may be required at the operating airdromes. During the Nicaraguan revolution of 1926-27, a small party of revolutionists in civilian attire succeeded in penetrating the guard and actually placed a bomb in the cockpit of one of the federal planes on its home airdrome. One determined man could cause great damage by setting fire to the gasoline or detonating the explosives. If such danger exists, it will be advisable to detail an airdrome guard from the nearest ground organization. Such guards were required by Marine air squadrons in both Santo Domingo and Nicaragua. In order to avoid the damage of possible detonation, the bombs should be removed from all airplanes at night. It may be advisable to use barbed wire entanglements around certain vulnerable areas. Riot guns and Thompson sub-caliber guns are excellent weapons for airdrome guard duty. The possibility of the enemy possssing aircraft should always be borne in mind. Each air squadron on expeditionary duty should be equipped with a platoon of antiaircraft machine guns. They can be manned by the armament personnel and are useful as ground guns as well as for antiaircraft defense.

5 EMPLOYMENT OF THE TYPES. Necessity may require the employment of several or all types of aircraft in minor warfare.

a. Pursuit. This branch of aviation can be very successfully employed in ground attack under certain conditions. Its use on such missions, however, will be confined to emergencies. The pursuit, or fighting plane is

greatly inferior to the two-seater in ground reconnaissance. It is not well adapted for infantry liaison, frequently a matter of considerable importance. It is not advisable to make dive bombing attacks with the auxiliary tank attached. Without that tank its cruising range is considerably limited. It is equipped to carry only one-half the bomb load carried by two-seaters.

b. Attack. At first thought, it would appear that an airplane especially designed for ground attack would certainly be the best one to use in the type of warfare under consideration. This is not necessarily the case. The ground attack plane as now contemplated for use in major warfare is designed with the idea of making very low, contour approaches in formation, delivering a heavy frontal fire and dropping a large quantity of bombs, unaimed, over a considerable area. In bush campaigns, tactics of this nature will only be practicable on certain occasions. If other tactics are employed, the speed, climb and maneuverability are seriously affected by the weight of the armament carried and the design of the plane. For the same reasons the plane will not be a handy one for carrying out infantry missions in the close quarters frequently encountered in rough, mountainous country. In Nicaragua, Naval observation planes sometimes carried out missions under such circumstances, after attack planes of the Army type had failed. This is mentioned to illustrate that a fairly high performance is required to do the work efficiently under all conditions that are likely to be met. Nevertheless, the standard type of ground attack planes have been used effectively in bush warfare and, no doubt, will continue to be so used. In Nicaragua it was found desirable to remove the two synchronized front guns and to move the bomb racks outboard from behind the landing gear so that dive bombing could be executed with safety.

c. Bombardment. Missions for bombardment planes, employed as such, will be comparatively rare in a guerrilla campaign. Occasionally the enemy may establish a large stronghold that would be a suitable target for bombardment. It is certain, however, that he would never make that mistake twice. If a shortage of transport planes exists, it is quite possible that bombers might be employed to supply the deficiency.

d.—Observation. While the observation plane is not particularly well adapted for combat use, it does fulfill the other requirements demanded to a satisfactory degree. It will continue to be widely used on all missions performed in support of or in cooperation with ground organizations. The constant improvement in performance that is being made in planes of the observation type will result in a corresponding increase in its adaptability for the operations under consideration.

e. Amphibians. For operations over water covered areas, swamps, jungles cut by large streams or lagoons and rough country bordering lakes or seas, where landing fields are few or nonexistent, the amphibian plane is an ideal type for general use. The eastern coast of Nicaragua is a place

where all of the above named conditions obtain, and also sudden, violent tropical storms occur at certain seasons. Under these conditions a squadron of amphibian planes was employed with highly satisfactory results.

f. Transports. The transport plane is a comparatively new type in the military field but it has already proved its worth. Particularly is this true in the bush war where usually there are no hostile planes to interfere with operations. At present there is some difference of opinion as to the relative merits of the single engine plane versus the multi-engine type. The larger capacity and increased safety factor, if the ship is not overloaded, accounts for the greater popularity of the latter type in military circles. Practically all military transports are adaptable for use as ambulances, so no discussion of that feature is necessary. As previously noted, bombers may be utilized to some extent on transport missions. The absence of controls in the rear cockpit and the space afforded by the camera bay makes it possible to utilize a photographic plane as an ambulance in emergencies. The greatest drawback involved in the use of transports of the large type is the long run now required for a full load take-off. Increased power will remove this difficulty.

g. Special Types. Under exceptional conditions, seaplanes or flying boats might be used for certain operations. The reduced performance and increased maintenance makes such planes undesirable if any other type can perform the mission. There is a great field for the messenger type of airplane. A very light two-seater especially designed to land and take-off in the smallest possible space will prove to be a very valuable addition to the list of military aircraft of the near future. A Naval observation plane which very closely approximates, in performance characteristics, a two-seater fighter was used in the Nicaraguan campaign. While this plane had some disadvantages, it was the unanimous choice of all of the pilots for general duties over the front. For operations of the character under consideration, planes of the two-seater fighter type will very closely approximate the most desirable characteristics. With the exception of transports, commercial planes are not as a rule adaptable for military use.

6. Tactical Employment. This is not intended to be a comprehensive treatise on air tactics in general, but rather a discussion of the variations that are apt to occur in the bush campaign.

a. Effects of Ground Fire. In connection with ground fire, only the fire of such weapons as are likely to be found in the hands of guerrillas is considered. In any event, there has been little or no campaign experience had with automatic antiaircraft weapons of greater size than 30 caliber. In flying directly over the enemy, photographic planes can operate with entire safety at an altitude of 4000 feet. Hits on the planes are occasionally made at 3000 feet. Dangerous fire from infantry riflemen is encountered at 2000 feet, but the hits fall off rapidly above that altitude and practically

disappear at 3000 feet. These altitudes refer to the actual heights above the enemy and not necessarily to the altimeter readings. If the plane is not directly over the enemy, it may approach him at a flat angle to within 1000 to 1200 yards with a fair degree of safety. This is due to the characteristics of the trajectories of small arms fire and the great difficulty of estimating the range of the plane. If the enemy is located in a wooded or tree covered area, he has the greater difficulty in getting any hits on the planes at any range. Low flying planes are practically immune to hostile fire under such circumstances. If the enemy is directly in the line of approach of an attacking plane, he rarely is able to make any effective hits. If he is not in the line of approach of the plane, and is outside the dangerous area of the bomb, he will frequently deliver a destructive fire, especially when the airplane is at altitudes of from 200 to 800 feet. In Nicaragua the planes averaged about one hit per engagement. Under favorable conditions they often escaped hostile fire, but other times a single plane would be struck from 5 to 12 times in a single engagement. Ground fire cannot usually be heard by the pilot except at very low altitudes and when the bullets pass within three feet of the pilot's ear. Bullets perforating the wings or tail surfaces are not noticed by the crew unless the holes are visible from the cockpits. When they strike solid members of the fuselage, the shock can be plainly felt. All such shocks should be treated with suspicion and a landing made in friendly territory as soon as practicable. This is especially true if the airplane is not equipped with multiple gasoline tanks, a feature which should be embodied in all planes likely to be exposed to ground fire. Landings made after planes have been in action should be performed with care and alertness, as vital parts of the structure may have been weakened by gun fire and the tires may have been punctured by bullets. Violent maneuvers should be avoided by the pilot until his plane has been inspected for the same reasons. Careful pilots will invariably treat all ground fire as dangerous and conduct themselves with due respect for it. This is not intended to convey that a lack of boldness is advised, but rather as a caution against unnecessary exposure on the part of over-enthusiastic personnel.

b. Infantry Missions. The infantry missions will frequently be combined with others, the character of which will be discussed in succeeding paragraphs.

(1) The primary purpose of this mission is to provide the means by which the ground troop commander may keep contact and exchange information with the advanced elements of his organization. It is of great importance because often it is the only means by which organized effort can be obtained under the circumstances prevailing. The commander is able to keep himself informed as to the progress and movements of his advanced elements, to modify his instructions to them, to provide for their

emergency needs and to supply them with the latest information. In turn, such elements are able to coordinate their efforts with those of others, and to report their own situations promptly and accurately. The air patrol may also supply the advanced elements with local reconnaissance, assist them in combat and render emergency assistance in many other ways.

(2) Infantry missions are so frequent that they practically become matters of daily routine. The number of planes assigned to one mission depends entirely upon the situation. Missions that are carried out entirely in friendly territory may be performed by a single plane. Usually it is necessary to penetrate difficult terrain and unfriendly areas. On such occasions a two-plane patrol is advisable. Sometimes, when trouble is anticipated, a three plane formation should be ordered. The airplanes will be equipped with fixed and flexible guns and double bomb racks. Each cockpit should be equipped with a let-down board having a writing pad and pencil attached. The pilots carry complete maps of the area and panel code cards. In addition to these articles, the observers require field message books, message dropping sticks or bags, Verys pistols and a message pick-up line, with an extra fish. All of these articles must be securely but conveniently placed so that they will not get adrift during violent maneuvers of the plane, yet will be within handy reach. The most experienced pilot, regardless of rank, will be designated as patrol leader. He will carry an experienced officer observer. The other plane, or planes, may be manned by less experienced personnel or by enlisted personnel. In the latter case it is usually best to place an officer observer in a plane piloted by an enlisted man, or an enlisted observer with an officer pilot. Other planes in the patrol conform to the movements of the leader and cooperate in carrying out the mission. All pilots and observers keep careful chronological records throughout the flight. Separate patrols are usually ordered to operate with the different ground units in the hostile zone, although such is not always necessary. Sometimes one regiment will require two air patrols and sometimes one air patrol may serve two regiments. Occasionally it is advisable to have the air patrol perform a part of its mission while en route from the base to the advanced landing field. However, it is usually a better practice to have the patrol proceed directly to the advanced landing field, and to complete the organization of the mission from that point. A representative of the ground commander should meet the planes at the advanced field, impart the latest information to the personnel of the air patrol and state the wishes of the organization commander with regard to the mission. The planes then proceed to the various outposts, columns or other advanced elements. Throughout the flight a careful reconnaissance is carried on. Upon making contact with each ground detachment or organization, information is exchanged. The leading plane makes the liaison while the other circles above and checks the signals made. The messages dropped will contain a copy of the complete air report of the preceding mission in that

area. After reading the panel signals, there will often be medicines or other emergency articles to drop and message pick-ups to make. Sometimes the air patrol will be required to make a close reconnaissance of the local area and return later with a report of same. Occasionally the ground troops will be found in contact with the enemy and will desire support from the planes. The airplanes will have a prescribed number of bombs on the racks for such emergencies and for use in case of a chance meeting with the enemy. Such meetings frequently occur. On certain occasions the ground troops will not desire to disclose their positions by communicating with the planes. A prescribed warning panel will be displayed in such cases, or previous instructions may have been given, and the planes will not remain in the vicinity. Upon completion of the mission the patrol will usually return to the advanced landing field and make an oral report to the ground organization commander. At this time tentative arrangements for the next mission may be made. The patrol then returns to the base airdrome. Upon landing a brief preliminary report of the mission will be made orally to the operations officer, who, if the circumstances warrant, will make a similar report by telephone to the next higher command. The patrol personnel should then assemble at the operations office and the chief observer will carefully compare and check his notes, step by step, with those of the other members. When this has been completed, the written report will be immediately prepared. As may be noted, the technique of making the actual liaison with the ground troops does not vary greatly from the usual methods. However, due to the absence of other means of communication, this mission is usually of much greater importance than the usual battle reconnaissance flight. It is of greater scope and of much longer duration. It is necessary that the ground troops be indoctrinated with the knowledge that the operations of the planes are limited to the fuel endurance, that weather conditions may be threatening and that the air patrols may have other and vitally important missions in hand. It is essential that all liaisons be conducted with intelligence and expedition. Short cuts and time saving methods should be employed wherever possible. Message pick-ups should not be used unnecessarily, and pick-up stations involving difficulties for the planes should be avoided to the greatest degree possible. Maneuvers of the plane can be substituted for panel signal acknowledgements, thus avoiding the delay incident to the use of pyrotechnics. The officer operating the panels should have his messages coded in advance of the arrival of the air patrol. If panel strips are available in sufficient quantity, two or three groups of signals can be displayed simultaneously. There are many other similar means by which the communications may be expedited. A resourceful panel station officer will never be at loss in getting messages laid out. If he loses his strips, he will remember that undershirts make fairly good substitutes. If the panel code does not suffice, he can spell out a word in open language. The correct meaning of a garbled message will usually be de-

duced by an experienced observer. Difficulties in ground-air liaison sometimes occur due to circumstances not apparent to both parties. This sometimes leads to an exchange of sharp or uncomplimentary messages. This tendency must be curbed at the outset and patience enjoined.

c. Visual Reconnaissance. The primary mission of the reconnaissance flight is to obtain information of the enemy or of the terrain, or both, by visual means.

(1) The equipment carried on this mission will be similar to that employed on the infantry mission, except that the articles taken for ground communication are limited to such as are necessary for emergency use. The number of planes employed will be, normally, two or three, according to the situation. If it is the object of the mission to determine the weather conditions or to locate an objective for immediate attack by ground troops or by a larger formation, it may be advisable to dispense with the bomb load and carry a radio set instead. The bulk and weight of the present types of radio sets make it undesirable to carry them in bomb laden planes. The organization of the personnel is the same as in the case of the infantry patrol.

(2) The reconnaissance patrol will either be assigned an itinerary or a limited zone in which to operate. The latter is usually preferable. Aerial reconnaissance is art in which skill can only be acquired through actual experience. It is the most difficult of missions and the relative skill attained by the various pilots and observers will vary with the individuals. The absence of hostile aircraft will permit the planes to operate in echelon. In exploring a terrain feature, the leader will usually perform "S" turns along the general route. The planes in the rear will maneuver in similar manner but always shaping their courses so that they will view the same objects as the leader does, but from a different angle. This will cause them to obtain the same views under different conditions of light and shade. The altitude flown will depend entirely upon the situation. Small groups will be sought from lower altitudes than large ones. Wooded country, or thick bush will require closer examination than open terrain. The planes will endeavor to utilize surprise by approaching suspicious localities up-wind, with throttled engines, flying just as low as possible. The enemy can be effectively reconnoitered at extremely low altitudes when he adopts hiding tactics. If he is aggressive and is attempting to surprise planes with ground fire, greater caution is necessary and higher altitudes may be flown. Generally speaking, 1500 to 2000 feet altitude affords the broadest view at the maximum height at which the observer can identify personnel readily. At higher altitudes it is difficult to distinguish between mounted men and pack trains, men and women, horses and cattle, etc. As previously stated, the flight personnel must be alert to avoid flying directly over a hostile group. Sharp eyesight is the key to success. This is facilitated by knowing what to look for.

The organization, equipment and habits of the enemy must be carefully and continually studied. A similar knowledge of general conditions existing and the normal appearance of the enemy terrain are equally important. Basically, reconnaissance consists of distinguishing between the normal and the abnormal. The enemy will attempt to create an appearance of the former condition, but like all human efforts, there will always be certain defects which will betray the situation to the skilled observer. In each airplane, there must be coordinated team work between the pilot and the observer. They should employ a system of hand and finger signals, similar to that of the deaf and dumb language, for the quick exchange of intelligence. The following are a few of the more common messages applicable: "That place looks suspicious." "I would like to examine that place more closely." "I saw (so many) men take cover there." "I saw (so many) animals (horses or mules) there." "We are receiving rifle (machine gun) fire from there." "Fire a burst into that place." "Fire tracers into the exact spot you mean." "Sit down. I am about to dive." "Take the controls." "I am wounded." "Jump. I shall follow." These, and similar signals, can be quickly made when there is not time to exchange written notes. A quick movement on the ground is apt to catch the eye and thereby become the key to the situation. The enemy, warned by the sound of the engine, will often see the plane before he is discovered by the airmen. Anticipating this condition, the pilot should devote his atteition to the area in front of the wings. By so doing he will often detect the enemy hastily taking cover. Large bodies have often been discovered by a mere glimpse of a white shirt, a straw hat or a frightened animal. The observer will occupy himself with a closer inspection of the area in rear of the wings, keeping an eye on the escort planes to promptly report any signals or unusual movements by them. The pilots will recognize the fact that the observers have a considerable advantage in observation and always give greater weight to their observations than to their own. The escort plane personnel frequently discover important things that have been overlooked by the leader. Thick trees are the favorite cover. When in camp the enemy will often picket his animals in such growths as banana groves. By diving at such places with full throttle, the roar of a steel propeller will often cause the animals to stampede and reveal the camp. In reconnoitering a trail ahead of ground troops, the enemy tactics should be borne in mind. In selecting an ambush position, he first seeks a place with a good avenue of retreat for himself. He next looks for a position with good cover at close range, and one that will restrict the movements of our troops as much as possible. Such a position will not often have the additional advantage of protecting the enemy from view from the air. If the air patrol approaches from the enemy rear it will sometimes be able to catch him in his own trap. At the beginning of a campaign, the enemy will probably take cover in buildings when such are at hand. After a few have been trapped in buildings and destroyed, they will learn to aban-

don buildings at the first sound of an airplane. The presence of a group in or near a village can often be detected by the amount of laundry seen drying in the sun. The guerrillas usually live off the country so the presence of an abnormal number of domestic animals will be grounds for suspicion. A town that appears to be completely abandoned should always be regarded with suspicion and very closely observed. If the enemy is hiding there, some member of the party will probably decide to find a better place and make a dash for it. This may be induced by the patrol making a feint to attack. Under some circumstances, it will be possible to develop the situation by use of a few bursts from the front or rear guns. Occasionally a bomb may be expended for the same purpose. The detection of hostile rifle and machine gun fire is difficult. Occasionally it is heard, sometimes holes in the wings are seen and at times, weapons may be seen in the hands of the men. It is more frequently detected by sight. In strong light small puffs of smoke can be seen from fairly low altitudes. In heavy shadows, flashes are seen. The intervals between the flashes or puffs will indicate whether the fire is automatic or single shot. Elongated flashes will be noted when the fire is directed at another plane. Flashes of fire directed at the observer appear as round balls of fire. In some actions, even though the planes have been hit repeatedly, not a shot will be seen or heard by the air personnel. Irregular troops always leave a certain amount of rubbish about places where they camp. The entrails of recently butchered animals attract birds of carrion. The presence of turkey buzzards will always invite investigation by curious air patrols. In Nicaragua, the bandits carry rations wrapped in fresh banana leaves when on the march. Their movements were sometimes detected by aviators noting such leaves at halting places along the trails. Where there are dogs, there are also men. The dogs that follow troops sometimes disclose their hiding places. There are just a few of the small signs that should be noted and carefully interpreted. The correct estimation of numbers is a matter that requires a great deal of practice before skill is acquired. A marching column can be estimated by either judging its length and multiplying it by the density, or by counting a section of the column and then estimating the number of such sections contained in the entire column. The latter method is preferred by most observers. Men deployed or partially concealed present a more difficult problem. A comparison of the number of men actually seen with the area occupied will enable an experienced observer to make a fairly close estimate. The character of the terrain must be taken into account. The combined observations of several pilots and observers will greatly assist in forming an accurate estimate. It is sometimes rather difficult to distinguish between the hostile groups and the noncombatants. No fixed rules can be laid down in such cases. The aviators must have an intimate knowledge of the characteristics and habits of each group. Their movements and actions frequently are guides. The known proportion of men to women in each group is an in-

dication. Pilots will always bear in mind that innocent people will sometimes flee upon the approach of airplanes. The location will generally have a direct bearing on situation. Observers who know their terrain will readily detect the presence of excess population at any point.

d. Photographic Reconnaissance. The zone of operations will usually be too large to permit of a mosaic being made of the entire area. Numerous obliques and some mosaic strips of certain areas will be required. It is well to proceed immediately and make obliques of all towns, villages and landing fields in the zone of operations. They are certain to be required sooner or later. If desired, mosaics can be made of enemy positions from altitudes as low as 4000 feet. Such mosaics are not economical of material but they are very rich in detail, especially when viewed in a stereoscope. Photographic planes operating at low altitudes in unfriendly territory should have armed escort planes to accompany them. It is essential that supersensitive film be available in order that important missions can be performed under unfavorable light conditions. Many calls for photographic assistance from intelligence sections may be anticipated. The interpretation of aerial photographs should ordinarily be done by the air personnel who, being more familiar with the details of the terrain, can do this work with greater accuracy.

e. Ground Attack. While it is not possible to completely destroy the guerrilla enemy with aircraft in ground attack, it is possible to inflict severe casualties, shatter his forces and drive him into heavy cover whenever and wherever he is found. His daylight movements can be restricted, his operations can be confined to terrain offering good cover, he can be prevented from occupying villages or strongholds, his foraging parties can be interfered with, his forces can be obliged to operate in fairly small groups and his morale can be broken and numerous desertions induced.

(1) The primary objective in bush warfare is the enemy personnel. The secondary objectives are his supplies and animal transport. The primary objective is easier to destroy than the secondary ones. Supplies are difficult to destroy and animals stampede, quickly scattering the suitable targets.

(2) The principal weapon used is the fragmentation bomb, which should be of about twenty-five pounds in size. This type of bomb is very satisfactory and can be effectively used in either diving or contour attacks. The fuse has sufficient delay action so that the bomb will penetrate inside buildings before detonating. No troops, guerrilla or otherwise, will stand in the face of a well directed fragmentation bombing attack. The enemy in the line of attack will scatter at top speed in all directions, endeavor to gain cover from sight and then fall into prone positions, if possible, in ditches, holes or depressions. Groups not in the line of attack, on the flanks, will endeavor to shoot the planes down. If the enemy is found in a permanent camp, he may have provided some light shelter. He may dig in

with light overhead cover, or reinforce the ceilings of buildings with two or three inches of gravel. In order to neutralize such efforts, it is well to have part of the formation carry light demolition bombs. The fifty pound demolition type bomb is an excellent size for such purpose. It is heavy enough to serve the purpose and its range is not too great to prevent accurate use at low altitudes, even though instantaneous fuses are used. The moral effect of demolition bombs is much greater than that of the fragmentation type, and they tend to greatly discourage enfilade fire from groups who believe themselves to be at safe distances from the smaller ones. They also tend to discourage any neighborhood recruiting. Incendiary bombs are not standard at present, but there is a good field for this type to be used against supplies and enemy shelter. Gasoline could probably be used as a filler with fairly good results. The use of multiple-fixed gun installations is not advocated. The length of time for which such guns can be brought to bear in the usual attack is very brief and the pilot is well protected from frontal fire by the engine. In attacking deep formation of well trained troops the case may be different, but, in the bush situation, it is believed that one fixed gun will be sufficient to cover the approach. The saving in weight is an important consideration. A remotely controlled gun in the center section of the wing, where it will just clear the propeller, is a very satisfactory installation. The elimination of synchronizer troubles has a good moral effect on the pilot, if nothing else. A single free gun is also believed to be sufficient. Most experiencd observers prefer to use one-third tracer ammunition. This has the added advantage of permitting the observer to point out to the pilot objectives which he may not be able to identify otherwise. In special situations, infantry hand grenades have been used from aircraft. Pilots and observers habitually carry pistols for use in case of a forced landing. Some pilots desire to carry sub-caliber guns secured in the fuselages for the same reason. Such weapons should be available for those who desire them. Up to the present writing, our Government has forbidden the use of chemicals from aircraft for reasons of policy. It would appear that no good reason exists for prohibiting the use of tear gas, an agent which could be very effectively employed. If the unrestricted use of chemical agents were authorized, the guerrilla enemy could be destroyed as fast as he could be located. No other forces would be necessary, than aircraft, and the hostilities would be of short duration. Under such circumstances, the guerrilla would be helpless and the cover that he now uses would only increase the potency of chemical agents. Any strange or unusual weapon also has a very great moral effect on an ignorant enemy.

(3) An ideal situation exists when the enemy is known to be concentrated at a certain place at a known time. This permits of a prearranged attack in formation, with a contour approach at low altitude. However, even such a situation may be attended with some difficulties if the enemy occupies a commanding position. Most situations will correspond to the

well known meeting engagement or cases where only meager information of the situation is available. In such cases a brief reconnaissance culminating in a quick decision is necessary. In some cases a little deliberation may be possible, while at other times immediate action is vital to take advantage of a fleeting opportunity. The leader will endeavor to include in a quick estimate the strength and disposition of the enemy, the locations of his flanks, the most sensitive part of the target and effect of the terrain, on both the enemy and himself. This estimate should lead to quick decision.

(4) The governing factor in making an approach, when action is contemplated, will generally be the principle of surprise. If the situation is known, the approach will be so arranged as to facilitate the attack being initiated in the desired direction. The governing consideration may be the terrain, the atmospheric conditions, the strength and disposition of the enemy or a combination of two or more of these factors. The object is to deliver a swift, powerful attack with the minimum exposure to hostile fire. A commanding position, on a high elevation, may warrant an approach from above the clouds, one in a valley or a depression will invite an extremely low altitude one, and flat terrain offers a variety varying between the two extremes mentioned. Prior to, or during the approach, the assault formation will be taken up. The following are a few of the factors that may influence the approach: An approach from the direction of the sun facilitates the assault, but greatly assists the enemy in directing fire at withdrawing planes at the time when they usually receive the most effective hits. An up-wind approach shortens the time that the sound of the engines will warn the enemy, but, unless the direction is changed, will slow the speed of the attack. Low altitude deadens the sound of engines and propellers, but it may forfeit the necessity of some reconnaissance and does not afford the opportunity of making a diving attack. A very low ceiling also absorbs sound, but it may also restrict the avaliable altitude seriously. Mountainous terrain may offer excellent cover for an approach, but also greatly restrict maneuvers during combat. Thus it is seen that many apparent advantages have as corollaries, distinct disadvantages. Any known or suspected defensive measures by the enemy must be considered. Each situation will offer a different solution, and a great variety of methods is essential to confuse the enemy. One case may be cited where a bandit group occupied a position planes could not approach without being both seen and heard in time to permit the group to gain good cover. Formations were flown past the location at a fairly high altitude until the enemy became accustomed to seeing them pass. Eventually the group became careless and a swift attack cut them off from their shelter. Very satisfactory results were obtained.

(5) In conducting the assault, as in all other elements of tactical procedure, methods of a fixed or routine nature must be avoided. Each contact will teach the enemy new defensive tactics which will reduce the effectiveness of future attacks unless counter-measures are taken. Occasionally

the enemy may be concentrated at a known time in a known position in sufficient numbers to warrant a low altitude formation attack. Such attacks will be conducted according to the usual methods and require no special discussion. Usually, however, the enemy will present fleeting targets, with the time and space factors such, that prearranged formation attacks will be practicable. In such cases, dive bombing tactics will be employed. Formations make dive bombing difficult to control and interfere with the maneuvering of the individual planes. Small columns obviate these difficulties and permit the planes to support each other in combat. If the objective is small, from three to six planes can operate in one bombing circle. If it is large, two or more columns may attack simultaneously. In such cases the directions of the attacks must be coordinated. The column leader will select the point of attack and lead the assault. The flight members should follow up on the same point to get mass effect, and gradually increase the size of the zone of attack, as the situation warrants. If the enemy shows a strong resistance, it may be well to make the opening attacks from a fairly high altitude. As soon as he is seen to break, all pilots will press the attack at the lowest altitudes. Attacks will be made in quick succession at the greatest speeds. Under hot fire, erratic departures are advisable, but each pilot must endeavor to keep the circle as small as possible and use his excess speed to recover his altitude. If the recovery can be made at the target, and it usually can be so done, the pilot and the gunner will be able to note the effect of their attack, observe the movements of the enemy and a skilled observer can get in several effective bursts of fire with the rear gun. A minimum of one thousand feet altitude is necessary to get up sufficient speed in the dive to assure safety and facilitate a rapid recovery. All pilots will be alert to note any enfilade fire, particularly from machine guns. Any pilot observing the source of such fire will divert his attack upon it. The formation can usually be kept well under control during the main effort. If there is any cover within reach, the enemy personnel will have entirely disappeared before the bomb racks have been emptied. In the opening attacks, the front guns will be used to cover attacks but after the enemy has broken, it will be used sparingly as the magazines do not hold sufficient ammunition to permit of prolonged fire throughout the entire engagement.

(6) After the enemy has abandoned his positions, the fight develops into a final stage which may be termed the "mop-up." Small groups are dispersed and pursued, likely hiding places are strafed with front and rear guns and animals are destroyed or driven off. Sometimes it is possible to scatter and stampede the animals of the enemy, so that a return attack can be made about the time he will succeed in rounding them up.

(7) The rally is usually made by prescribing an altitude and direction from the scene of action. When the leader pulls out, climbs to the prescribed position and circles, the formation will form on him. All pilots should be alert at all times to observe this maneuver by the leader. The

deputy will be especially alert to keep track of the leader and takes charge if the leader disappears. The fight is not broken off if the leader leaves, unless he executes the prescribed maneuver.

(8) Ground troops may be supported in action by aircraft operating in a manner similar to that described in the preceding paragraphs. In such cases, the infantry will display panels to mark their front line positions. The ground commander may display panel signals indicating the desired direction and distance to the objective that he wishes the planes to attack, or it may be necessary for the air leader to act upon his own initiative. The presence of friendly troops will influence the direction and point of the attack by the air formation. Attacks will rarely be made toward the friendly lines. In actual practice, considerable success has been had in supporting ground troops when they have found themselves in defensive situations. Considerable difficulty has resulted in coordinating the attacks of ground troops and aircraft in offensive situations. The reason for this is that the ground troops can seldom determine the time of the attack in time to notify the air commander. However, efforts will always be made to furnish air support when such appears feasible. The synchronizing of time in the field is an important detail. A simple and effective means of accomplishing this is to have the air patrol each day drop a message reading, "When I fire a green star it will be exactly, such or such, time." The observer will have the standard time for this purpose.

(9) In the bush war, accurate maps of the zone of operations will seldom be available. It is necessary to use photographs, blue-prints, sketches and charts, often crude and without any scale. The best that can be done is to assume that river junctions, well known towns and certain well defined landmarks are correct on the maps or sketches, and refer to other locations with reference to them, using compass bearings and estimated distances. Frequently it will be necessary to learn the names of unmarked places, and other landmarks that are too badly misplaced to permit of identification, by interviewing ground patrol leaders and civilians. Such data will be promptly posted on the situation map in the operations office. Intelligence reports often refer to ranches and plantations. All friendly civilians occupying such places should be requested to paint their initials on the roofs. This greatly facilitates operations. In guerrilla operations, there is no objection to pilots and observers carrying panel codes over the front, as they are of no particular use to the enemy. In case of a forced landing, however, they should be destroyed as the infantry usually uses the geographical code to avoid writing the names of places in field messages. Whenever it is believed that a geographical code has fallen into the hands of the enemy, a new one will be prepared and issued.

7. Command Missions. If intensive operations along the lines previously referred to are being conducted, and an air transport service is being operated, the organization will not be greatly taxed with calls for command

missions. One plane will, however, always be in readiness for this purpose. From time to time urgent messages will have to be carried, special medicines must be rushed to some point, rumors of some serious situation require immediate investigation, etc. Occasionally commanders or staff officers of the ground organization will desire to make a personal reconnaissance of a front line activity, but not often.

8. Air Transportation. In bush warfare, transport airplanes will be provided in greater number than that required to provide for the needs of the air organization in order that the needs of the ground troops may be met. To facilitate operations and maintenance, the transport should be organized into squadrons. Regular flight schedules can be flown in certain areas, but landings at fields exposed to enemy raids should be made at irregular intervals, as previously stated.

a. Air Service. The air organization should always have priority on the transport service. This service consists of transporting the necessary personnel and material to advanced landing fields to permit of advanced operations being conducted therefrom. Certain advanced fields may be kept stocked as semi-permanent bases while in other cases, the transports may be flown to advanced positions where the planes themselves will serve the operating units for single operations only. When transports are so used as mobile bases, a portable radio set can be carried if the need of such communication exists. With certain types of radio aircraft installations, it is possible to communicate at considerable distances while the airplane is on the ground. If only emergency operations are conducted from advanced landing fields, the problem of air supply for such operating units is comparatively simple. If, however, such operations become fairly intensive, the quantities of munitions and gasoline assume considerable proportions and require almost continuous transport service to supply them.

b. Ground Service. The transport service rendered to ground troops may consist of ambulance service, transportation of personnel or service of supply. The situation may require concentrated effort on one of these services, or all three may be carried on more or less simultaneously. In any event, the demand for air transportation always exceeds the available capacity of the planes. An air commander who can always satisfy all of the numerous patrons of the air transport service will be gifted with exceptional tact. A general policy stating the classifications of persons and articles considered eligible for transportation by air, together with a definite priority for each, should be adopted and published in orders. The permits for air travel and air shipments should be controlled and coordinated by the staff of the next higher commander. Transport squadron commanders and operations officers, who are in close touch with the needs of the troops in the field, will assist as far as possible in the adjustment of minor details of priority that arise daily. Stocks of articles having secondary priority should be kept at the airdrome

for use as ballast when the planes are called out on emergency flights. This will assure that every flight to the front will be fully loaded.

(1) Ambulance calls will usually have first priority. Serious cases frequently require special emergency trips, but a great many of the sick and men suffering minor wounds can be evacuated on the return trips of the regularly scheduled flights. Whenever it is known that medical attendance will be required in flight, the medical attendant should, if possible, accompany the plane on the out-bound flight. This obviates the necessity of flying the attendant back to his station, and does not deprive the field troops of medical men. Ambulance flights are generally considered as emergency measures and are not delayed in the absence of any formal authority.

(2) The personnel to be transported consists of organization commanders, their staffs, certain casuals and minor troop detachments. Strict regulations are necessary to avoid congestion in this kind of traffic. This service does, however, greatly relieve the fighting organizations from demands for command missions. Hard and fast rules regarding baggage limitations are essential. Minor troop movements by air will be authorized by the third section of the staff. All transport planes available are pooled and operate as a squadron. Repeated flights may be necessary to accomplish the movement. Constant care must be exercised to make certain that the planes are not overloaded during such operations.

(3) The policy concerning air supply will be dictated by the number of planes available, the character of the operations and the general situation. In some cases it will only be possible to supply articles of an emergency nature, while in others an isolated detachment may be supplied wholly by air. Not infrequently, the transports are called upon to supply columns in the field by dropping emergency articles. There is urgent need of a type of parachute especially designed for dropping emergency supplies in order that losses due to breakage may be reduced. The list of articles for which air transportation is continuously requested is too long for detailed consideration. Medical stores usually have first priority. Urgent requests for the immediate delivery of articles of diverse natures come in daily. For morale reasons, the commander will desire the prompt delivery of the mail. It is usually received spasmodically and, therefore, arrives in large quantities. Economy can be accomplished by removing cases and containers unnecessary to protect articles carried in airplanes. Government funds are habitually transported in airplanes. It will be readily appreciated that specially trained personnel is required to check, weigh, bill and supervise the conduct of air traffic. It is essential that abuses be avoided in order that unnecessary restrictions may not ensue.

9. INTELLIGENCE: If the air commander devotes himself to a careful and continuous study of intelligence from all sources, he should have a more intimate knowledge of the general situation than any other officer in the entire

organization. This will be apparent when it is considered that he not only has access to all ground and air intelligence reports, but he also has a good knowledge of the terrain, is able to personally interview officers in the zone of operations and can participate in active operations on all parts of the front. He should be immediately supplied with copies of all ground intelligence reports, reports of the movements of friendly troops and all operations reports. With experience he will learn to evaluate intelligence reports with skill. Such reports will often be the basis of the estimate governing the air operations. Such details as the character and habits of enemy leaders, their personal histories, the character of their men, the type of equipment used, etc., are carefully studied. For example, the knowledge that the enemy is accustomed to observe certain feast days with alcoholic celebrations may afford a long sought opportunity to catch him off his guard. The newspapers published in adjoining countries often provide valuable sources of information. It is possible to arrange to have airplanes dispatched to the capitals of neighboring countries on "diplomatic" missions where valuable information is available. When all is said and done, accurate intelligence information will always be the keynote to successful operations.

10. Miscellaneous Missions. The enemy will attempt to gain support own and adjoining areas by spreading false and exaggerated reports of our actions and intentions. He endeavors to inspire his own troops and his supporters with fake reports of brilliant successes in the field. An excellent counter measure is to employ airplanes to scatter our own propaganda circulars among the enemy troops and sympathizers. During the Nicaraguan campaign, airplanes were used on several orcasions to deliver ultimatums and letters to certain bandit chiefs. On such missions, the airplane, escorted by a small combat formation, would proceed to a locality known to be occupied or frequented by the followers of the chief for whom the message was intended. The plane would then circle very low while the observer displayed a small white flag. Eventually some persons would show themselves and the message would be dropped in the usual manner. The messages were invariably delivered. Expeditionary air squadrons will be called upon, from time to time, to perform diplomatic courier missions. Frequent requests for flights are made by newspaper correspondents and news photographers. Such flights should be controlled by the staff of the next higher command. Occasionally large formations may be flown over a certain locality as a military demonstration or warning. Frontier and coast line air patrols are sometimes used to intercept the smuggling of arms and supplies. One very important function of the air organization is that it constitutes a powerful, highly mobile reserve in the hands of the commander, by which he may influence the situation in any part of the zone of operations in the shortest possible time.

11. Conclusion:

a. Organization and Training. No fixed complete organization for expeditionary duty is advisable. A suitable number of the smaller units, com-

prising the various classes and types referred to herein, should be organized, equipped and trained at all times. This group of smaller units will form a very flexible reserve from which an organization to meet the special needs of any situation can be readily formed. Frequent training exercises with ground troops should be carried out. In formation work, great flexibility and the maximum development of signal communications should be featured. Once the organization is operating in the field, it is necessary to arrange for some training for the new personnel. Even experienced pilots will require indoctrination, opportunity to study the terrain and the situation, check-ups on their skill in gunnery, bombing and liaison work, followed by "breaking-in" flights over the zone of operations. In the cases of "old" pilots, this period will require at least two weeks. Facilities for conducting gunnery and bombardment training should be available to all air units on active service. Perfection is never attained.

b. Tactics. The tactics employed must be versatile to the last degree. Air leaders will constantly study the situation to devise new ruses or strategems which may be utilized to employ the well-known principle of surprise. When the enemy is encountered in a vulnerable disposition, a swift, well directed attack will shatter his ranks and break his morale. If precautions are taken to evade enfilade fire, and full use is made of the speed and maneuverability of the aircraft, success can be gained with comparatively little loss to the attacking planes. On the other hand, if a pilot exposes himself to heavy ground fire in the belief that he cannot be hit, the error of his judgment will quickly become apparent.

c. Reports. The only important report that merits special consideration is the one pertaining to the tactical operation. Each tactical mission should be fully covered in a written report. The greatest care should be taken in the phraseology used and the accuracy of the statements made. Opinions and facts must not be confused. A good form for such a report consists of a heading, a number, three paragraphs, the authentication and the distribution. The first paragraph contains a statement of the mission, the number and type of aircraft, names of personnel and the route flown. The second paragraph contains a brief chronological record of the flight, including time, place, observation and action taken. The third paragraph is used to amplify any important events noted in the second paragraph, to comment on the operation or to state an opinion, to make brief note of the weather conditions affecting either air or ground operations, a statement of the ammunition expended, casualties suffered by planes or personnel and an estimate of the enemy casualties. If these reports are carefully and conservatively prepared, the full confidence of the ground commanders will be readily gained. Opinions should be given sparingly and when the doubtful element is small. It will be borne in mind, that in war, the reports of the personal observations of officers are accepted as facts until proved otherwise. Great harm can result if a situation is misunderstood through a misinterpreted report.

d. General Conduct of Operations. The senior air officer should have the same dual staff and command status that is given the artillery commander in the infantry division. In other words, the senior air officer should actively command the air organization and at the same time serve as the advisor to the commander on air matters. The commander will desire to have personal contact with the air officer, who is in close touch with the major activities of the entire organization. The air squadrons will operate in support of the ground organizations and also independently. In certain special situations, planes may be attached temporarily to ground units. As a general rule this practice should be discouraged. Better support can be given in most cases if the control is centralized. When supported troops are operating on letters of instruction, the responsibilities of the air commander are great. He is called upon to exercise initiative to a marked degree and must be imbued with the spirit of cooperation. Great patience and untiring perseverance are indispensable qualities. Close relations must be cultivated with the commander and staffs of the organizations with whom he operates. Careful handling of his own organization is necessary in order that the morale may be kept high and the spirit of loyalty inspired in spite of the attendant hardships of campaign. He should lead on the more important missions and show a disposition to take his full share of the extra hazardous operations. He will carefully study the characteristics and capabilities of his officers in order that he may take the best advantage of their special qualifications when emergencies arise. Ordinarily missions will be rostered for the flying personnel, but from time to time situations will arise where it is essential that personnel possessing certain knowledge or qualities be employed to insure the maximum of success. Each evening, the air commander will estimate the situation for the following day. When he has reached a decision, he will impart his instructions to the operations officer. The hour for getting out the next days orders should be late enough to permit the commander to study the various reports and orders of the day, but not so late as to interfere with the rest and recreation of the personnel. Squadron commanders, pilots, observers, flight chiefs, crew chiefs, armament men, and others are interested in learning their duties for the following day before they turn in. During the daylight flying hours sufficient personnel to answer emergency calls must be constantly in readiness. Small formations should be able to take the air on twenty minutes notice. Night operations are seldom required, so every opportunity for rest and recreation should be had after sundown. Operations orders are too numerous to permit of typing or mimeographing. Occasionally formal written field orders are issued, but the usual daily missions are posted on a blackboard. The operations reports serve for purposes of record. The air organization will participate intimately in every operation of importance that is conducted by the expeditionary force. Aviation has already demonstrated its great value in minor warfare, and the future officers unbounded opportunities for further development.

WITH ROY CHAPMAN ANDREWS IN MONGOLIA

By CAPTAIN W. P. T. HILL (A. Q. M.), U. S. M. C.

UNDER THE leadership of Doctor Roy Chapman Andrews the American Museum of Natural History of New York City has sent several expeditions into different parts of China during the past thirteen years to collect specimens of animal and plant life, past and present, to study the geology, paleontology, and archeology (leading to the study of the geologic, paleontologic, and archeological history of Central Asia), to map the geography of the country visited and to study the people, their modes of life, customs, and physical environment.

At first, Dr. Andrews was mainly concerned with collecting exhibits and studying collections for the American Museum of Natural History and during his first two expeditions, those of 1916 and 1919, they were planned, organized and executed by Dr. Andrews acting in all capacities, as leader, director, foreman, and the whole technical and scientific staff himself. As the interior of Asia is inhospitable and comparatively inaccessible, Dr. Andrews had a difficult task cut out for himself.

After two years of preliminary work along the borders between the slightly known and the almost wholly unknown regions, Dr. Andrews began planning for a third expedition. In following all of his scientific branches, it had become clear to him and to his chief, Professor Henry Farfield Osborn, President of the American Museum, that a more elaborate expedition was fully warranted. Professor Osborn had long held that Central Asia was likely to produce valuable evidence in the story of the evolution of the vertebrates. "It might be the home of ancient man, or the cradle of the human race." Thus in 1922 the Third Asiatic Expedition became an exploratory investigation, so constituted and operated as to make feasible the penetration of otherwise inaccessible territory and covering many times more ground than had ever been possible in a single season.

The study of the geologic and paleontologic history was begun that season, and has been continued ever since, with additional field work in 1923, 1925, and 1928; (and two other attempts, one in 1926 and one in 1927). In 1925 archeological and botanical studies were added. Each time large collections of rocks, fossils, animals and plants were made. Each time, also, more or less elaborate investigations were successfully carried on in the field and material was gathered for the continuation of such studies in the laboratory.

A resume of the operations follows in order to give a background to the picture. The expeditions have covered over 30,000 miles of traverse

across little known or wholly unknown territory. Approximately 4,000 miles of route surveys have been mapped, with considerable reconnaissance accuracy, by topographic methods, and more than 7,000 miles have been covered with geological structure sections. More than 2,000 square miles, distributed in fifteen separate areas, have been mapped geologically in considerable detail. Over 500 cases of fossils have been brought to the hands of scientific laboratories in addition to large contributions to botanical, zoological and archeological collections. A great deal of this material so collected is absolutely new to science. One of the strongest points of the expedition is the fact that the field work was done by the entire group collectively.

Geography

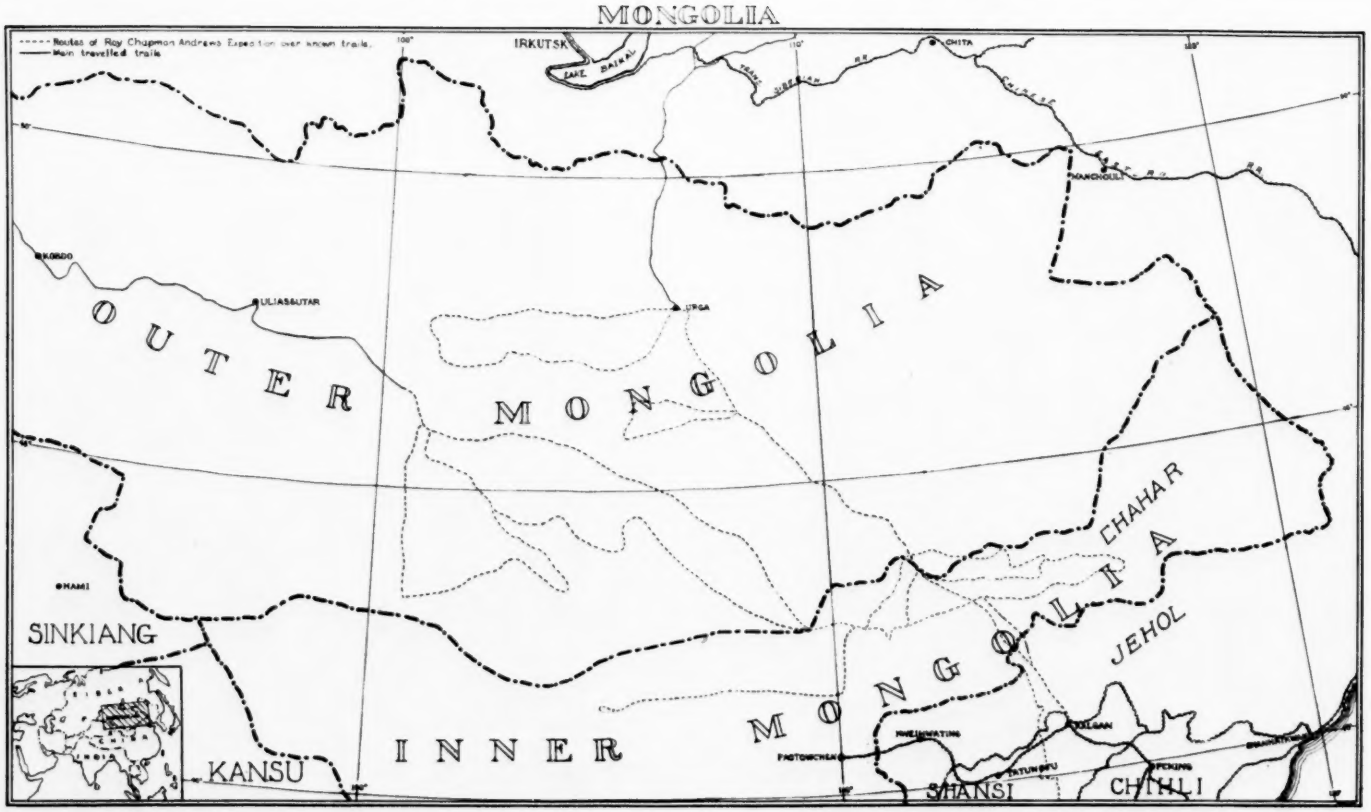
There were many maps of Mongolia before but they were not considered good, mainly because they were made along the major routes of caravan travel across the regions indicated by people not equipped to do accurate topographical work and in the main their indications are located in the wrong spot. Sometimes they do not show the right course and the detail is not always dependable. On this account, the maps and geographic observations of the expedition constitute valuable data and can be used for correction purposes.

Topography

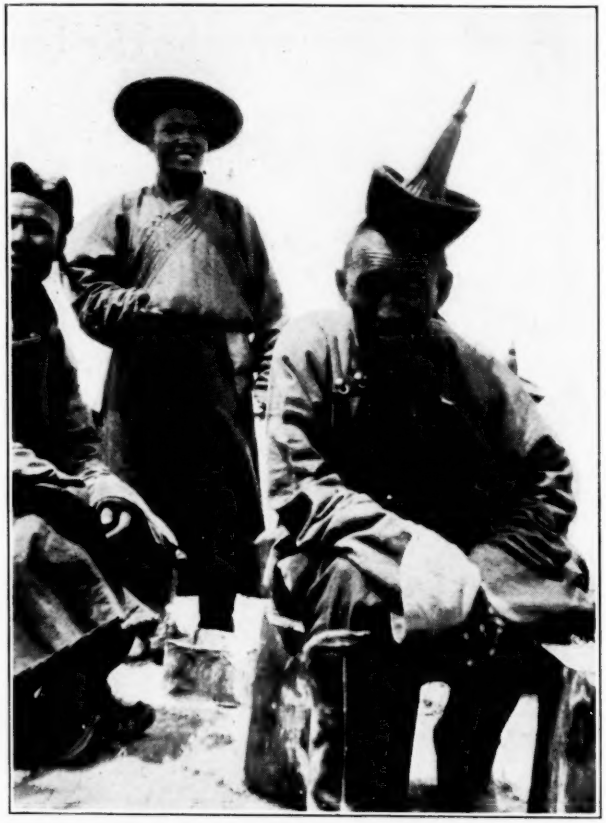
A large number of route maps and detailed locality maps were produced, those of the 1925 expedition by Major L. B. Roberts, Lieutenant F. B. Butler and Lieutenant H. O. Robinson, and those of 1928 by the writer. About 3,000 miles or more were covered in this manner. Locations were derived from solar observations, distances by stadia and automobile speedometer. Orientation was obtained independently of possible magnetic variation by means of the Baldwin solar chart; differences in elevation by vertical angles, and, in general, plane table methods were used. Time for observations were obtained from radio signals from accredited stations over a short wave radio set.

Photography

Mr. James B. Shackleford, A. S. C. E., accompanied all the expeditions except one of the earlier ones and has secured still and motion pictures of all phases of Mongolian tame and wild life. In completing this work Mr. Shackleford has made available to the world a complete pictorial record of all the industries carried on by the Mongolians, their mode of life, their customs and religion. When one speaks of the vast herds of antelope, wild ass, etc., that are so common in Mongolia at the present time it usually takes a set of photographs to prove to the average person that so much wild life actually exists. Also, as in most expeditions, the success of the venture must be shown to the public in still and motion pictures so that they may see

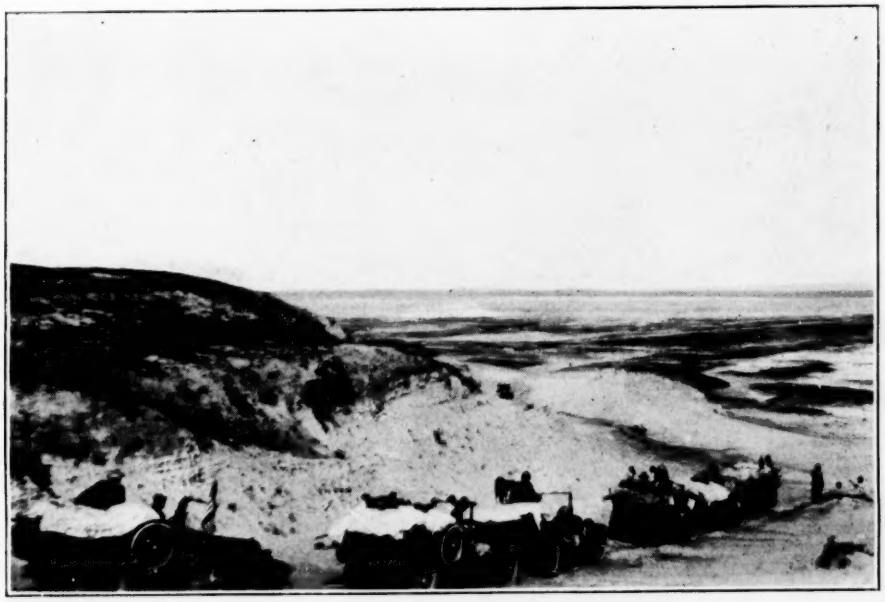

MONGOLIA
Routes of Roy Chapman Andrews Expedition over known trails.
Main travelled trails
IRKUTSK
LAKE BAIKAL
CHITA
KANCHUKLEI
KOBDO
ULIASSUTAR
URGA
OUTER MONGOLIA
CHAHAR
HAMI
SINKIANG
JEHOL
INNER MONGOLIA
KANSU
SHANSI
CHIHLI
PEKING

Mongolian Women and Children at Tseringol, Inner Mongolia

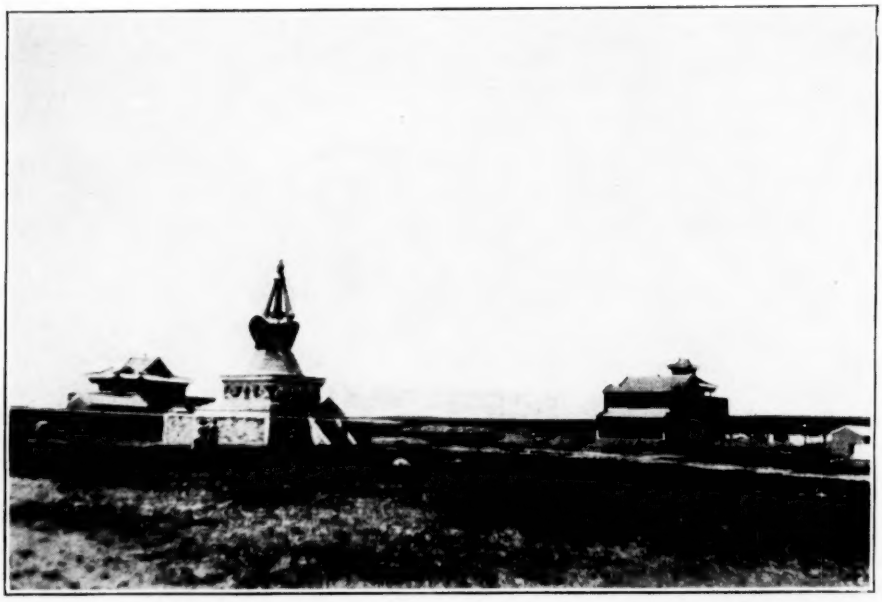


Mongolian Lamas (Priests)

Mongolian Women Listening to Radio Concert at Hat In Sumu



Motor Caravan Crossing Typical Country



Deserted Lamasery and Monument, East Tsetsen W'ang, Inner Mongolia

Mongolian Princes Yurt
(East Tsetsen W'ang)

and understand what the daily news notes are saying regarding the status of the latest trips. The still pictures are more of a scientific nature and are used in illustrating technical and scientific papers on paleontology, geology, archeology and the like, and show how the fossils were found, their condition and state of preservation, the state of the geological formations, the texture of the rocks and the state of erosion of the different formations. In paleontology the type of localities in which the remains of ancient man were found are used for comparison with other localities, and last but not least, the still pictures are used as illustrations for all popular articles gotten out for the general public.

Geology

Two notable contributions to geology have been made by Dr. Andrews' expedition. Of these the more obvious is represented by the classification of geologic formations and the mapping of rock units and structures for several thousand miles of new country. The less obvious but more valuable result has been the interpretation of these formations and related structures in terms of a relatively comprehensive geologic history of Central Asia, the last chapter of which has to do with prehistoric man.

The series of geologic sections, showing the underground structure, covers more than 7,000 miles of traverse fully identified with the physical features of the country. Therefore, these traverses have become essentially geologic base lines, from any point of which new traverses may be started. These sections are the skeleton or framework upon which all the geology of Mongolia and the geology of the whole of Central Asia will be built. They now make continuous sections connecting Siberia and China in a north-south line and Manchuria and the center of the Gobi on an east west line. The studies based on them have given the best understanding yet reached of the major elements of geologic structure of Central Asia. The geological column is now fairly well known. For the first time a systematic statement of the ages represented in the rocks of Central Asia has been compiled. The character, thickness, origin and relative age of each has been determined and about thirty new geologic formations have been described. The gaps in the record have been noted and a comparison made with the standard columns of America and Europe. Additional possibilities and critical localities have been pointed out where further work would be certain to yield results.

Geologic maps of fifteen areas were made showing the area, structural and topographic features of type localities. A total area of more than two thousand square miles is covered in this manner.

The geologic work of the expedition differs from much exploratory reconnaissance in that the objective kept always in view was the interpretation of the accumulating mass of data in terms of processes and origins.

Dr. A. W. Grabau, Dr. Chas. P. Berkey, Dr. Fred Morris and Dr. L. Erskine Spock, all known geologists, have made the main field explorations in the geological work.

Zoology

Dr. Andrews, whose first work was in this field and who, besides being one of the best known explorers in the world, is a noted zoologist, has made a large collection of living faunas in Mongolia. Mr. Clifford Pope conducted parallel studies for Dr. Andrews in China.

Some 7,000 specimens were collected and have been deposited in the museum. This collection is rich in forms new to science, no less than 50 new species and sub-species, and one new genus, having been discovered.

Botany

Dr. Rlaph W. Chaney was in charge of the botany and paleobotany for the expedition. He found that fossil plants are scarce and poorly preserved in the areas visited. Living species, however, are numerous and deserve additional attention. Numerous fragments of "petrified wood" all of small size have been collected, but no complete trunks of trees were discovered.

Paleontology

Paleontologic investigations were in charge of Dr. Walter Granger, who has accompanied all the expeditions into Mongolia since 1922. He has also conducted two expeditions into Mongolia since 1922. He has also conducted two expeditions into Szechuan province and one into Yunnan province in China for parallel studies. Drs. W. K. Gregory, W. D. Matthew, and A. W. Grabau have worked the collections returned to the museum.

A whole new world has been opened up to the paleontologist by the discovery of a long succession of continental deposits bearing fossil vertebrates, especially mammals and reptiles, and, in addition, a well-determined sequence of formations, each bearing a mammalian fauna that contains some highly specialized local types and some elements of affinity to faunas of corresponding age in Europe and North America.

Much evidence has been accumulated that will have a bearing on the hypothesis that Central Asia has been the principal center of origin and dispersal of mammals and the probable source of new types that from time to time appeared suddenly in the fossil record in North America and Europe.

The discovery of a new paleozoological region has naturally resulted in a great addition to the known vertebrate faunas. All the species are new to science. The great majority of the genera are new, and several of them represent new or little-known groups of wide scope. Owing to the extensive

collections made (thousands of specimens) and the expert methods of collecting, a large proportion of these new or little-known types are represented by numerous and complete specimens, by skulls and skeletons rather than fragmentary scraps that are the first fruits of exploration in a new region. A series of over 70 skulls with a dozen or less complete skeletons of the PROTOCERATOPS, in addition to the nests and eggs of this reptile, make its character, osteology, ontogeny and habits better known than those of any other dinosaur. Half a dozen mammal skulls found in one area are the only known Cretaceous mammal skulls.

Archeology

Cultures of both historic and prehistoric relations were found. The historic remains include evidences of former Chinese colonization in the southern border country represented by successive great walls, extending hundreds of miles into present Inner Mongolia, millstones, bronze objects, coins, etc.; camp sites, caves formerly occupied by the Mongols, and graves marked by upright slabs of stone, sometimes roughly shaped into effigies typical of the northwestern border of the Gobi and regarded as burial places of Turkic princes of the 7th and 8th centuries of our era.

The prehistoric remains include burial places of various types, pictorial rock inscriptions, quarry, workshop and habitation sites. The burial places are of various types, such as graves of round, oval and rectangular outlines, fenced by small stone slabs in standing positions; graves of roundish outline, covered by single layers of stone slabs or boulders, grave vaults of stone covered by large conical mound of boulders often enclosed by circular or rectangular walls, also of boulders and of larger dimensions. A large number of these burial places were opened, and a few of them yielded both skeletal and cultural remains dating in one instance as late as the Iron Age. One yielded the skeletal remains of a woman over six feet tall. Her burial robe had been made of small circular beads strung similar to a string of wampum, or of Chinese money, and worthy of note; some of the beads had square holes instead of round ones. (In practically every case the graves had to be opened by stealth, for as soon as one of the Mongols saw the excavation start he hurried to the nearest official to report the fact that the "lung gu rien" (dragon bone men) were digging in a holy place.)

The pictorial rock inscriptions represent the domesticated horse and camel, and some wild animal species, some of which are locally extinct. The petroglyphs, of the type elsewhere in the world identified with the Bronze and Neolithic Ages, are intimately associated with certain of the aforementioned burial sites, and like them give evidence of considerable age.

Quarry and workshops sites were found, especially in areas where red jasper and other varieties of rock suitable for flaking purposes are exposed to the surface. However, in the majority of cases, the material had evi-

dently been transported hundreds of miles, for no outcrops existed nearer than that. The waste products or rejects of the flint worker lie about in vast quantities and the varying degree of weather coating exhibited by the material indicate that man's first appearance in these localities is of respectable antiquity, and that the population at that time was far more numerous than it is at the present day. Some of the finished implements found on these sites correspond in type with certain of the Aurignacian and Mousterian tools of Western Europe. They would appear to be of Middle Paleolithic Age, variously estimated at from 40,000 to 200,000 years distant.

The habitation sites were marked by fireplaces and there were found around them articles of stone, bone, shell and pottery. These sites, of which traces were found in many widely distributed localities, are confined to geologically ancient depressions in the Gobi topography, which later have been more or less filled up by partially solidified sand dunes.

The significance of the human artifacts found in Mongolia lies in the fact that it is possible to interpret not the culture alone but also the physical environment of early man in the Gobi region. This is done through the careful correlation of geological processes and successions of events with the corresponding archaeological observations. Dr. N. C. Nelson carried on the archeological investigations and field work for four years, spending the summers in Mongolia with the expeditions and the winters in Szechuan and Yunnan provinces on parallel investigations. Dr. Alonzo Pond carried on with the 1928 investigations.

In addition to the scientific and technical staffs, there were usually about a dozen Chinese (cooks, taxidermists, mess attendants, assistants to the staff and a chauffeur or two) and from 15 to 20 Mongols (interpreters and camel men). The transport, in charge of Mr. J. Mackenzie Young (ex-Marine) consisted of one Dodge touring car and seven ¾-ton Dodge light delivery trucks (and at one time, two 1-ton Fulton trucks, which were dropped in order to simplify the spare parts problem and on account of their weight). There was also a caravan of 125 camels supervised by a Mongol caravan leader. The caravan preceded the expedition into the field a month or two and established supply points at lamaseries along the caravan route. Once we caught up with the caravan it either preceded or followed the motor cars to other selected supply points. In this manner foodstuffs, gasoline and other essentials were kept close at hand. When it became necessary to make longer jumps, two or three of the motor cars would return to the caravan for supplies while the remainder of the party carried on their investigations. The motor caravan averaged more than 50 miles per day while the camel caravan averaged about 17 miles per day. (A standard camel march is about 50 Chinese Li, or 17 miles.) Each camel carried a load of from 400 to 500 pounds, all depending upon the bulk of the packages. The foodstuffs,

(canned jams, milk, butter, etc.), were packed in camel boxes, each weighing about 250 pounds when loaded, each camel carrying two boxes, one on either side. The gasoline (packed to stand extra sloshing and joshing) weighed about 8 pounds per gallon and each camel carried sixty gallons, three cases on either side. The camel is after all a delicate animal, being very susceptible to lung trouble, etc., and their carcasses and skeletons, by the thousands, marked every route and trail that the expedition traveled. In the real hot weather most all of the traveling by the caravans was done at night or during the cooler portions of the day; then a rest of a day for the camels to graze and drink and then another night march, all according to the conditions of the camels. Those that were returning from the western borders of Mongolia were usually in better condition than those coming north from China.

The expedition depended for water supply on dug wells along the principal camel caravan trails. Such wells were from 5 to 25 feet deep and 2 to 4 in diameter, all depending on the depth of the water table in the locality. Some no doubt had been in use for many years as they showed signs of great age. They had all been dug by caravan leaders and were usually spaced at irregular interavls. All were open so that birds and animals might fall in and pollute the water. As all the animals were watered at these wells (camels, sheep, goats, horses, etc.), the water was not very palatable. However, the chlorine treatment usually fixed this up. During the summer rains, July and August, all the wells gave only brackish water, as the wells are located in low spots and the run-off soon fills them with the refuse left around by animals and caravans. Then only tea or water treated with a strong dash of lemon powder was the least bit palatable.

Fuel was furnished by using camel, horse, goat or other "chips," which were quite plentiful at all times along the main caravan routes, it being no uncommon sight to see some days thousands of camels loaded with wares of merchants going or returning from all parts of Central Asia, and late in the summer, when grazing was at its best, thousands of horse or ox-drawn Chinese carts could be seen, all heading to the north and west, hoping to deliver their cargoes and return before cold weather set in.

No trouble at all was caused by the failure of the Dodge cars to stand up under the strain. They always performed when called upon, whether in a blinding sandsorm that lasted for weeks or a veritable cloudburst of rain, which happened several times in July and August. Including evaporation of the gasoline caused by the excessive heat and loss by the hard handling while on the camels, the mileage per gallon averaged about seven (4,000 gallons carried, total mileage for the eight cars about 30,000 miles).

The expedition usually lasts six or seven months each year, the party leaving Kalgan the early part of April and returning the latter part of September. Leaving early or returning later would cause too much hardship, on account of cold weather and driving sandstorms.

The climate of Mongolia imposes a short growing season, ice forming in the wells and ponds until June and starting again in September. During the summer months, June, July and August, the days are quite warm but the nights are always very cool. During July a temperature of 140 degrees was quite common during the day and was recorded a number of times when a camp site was occupied for a few days. In spite of the excessive heat, fur lined sleeping bags were used by all hands at night during the hottest part of the season.

The only food the resources of the country afforded was meat. Our staples for the whole season, as well as dried and tinned goods, had to be transported. For meat, we depended chiefly on hunting, and antelope was our standard. As a change from this, a sheep was purchased from the Mongols and killed by them according to their "YASSA" or code of laws of Genghis Khan. "Forbidden to cut the throats of animals slain for food; they must be bound, the chest opened and the heart pulled out by the hand of the hunter." We had plenty of other game, and at certain times wild fowls such as duck, bustard and sand grouse. Large herds of antelope, estima.ed to be as many as 20,000 in some cases, were encountered in August, usually after the young were from a month to six weeks old. The fowl were quite tame and in a few cases bustard were killed by members of the party with revolvers or pistols. The ducks and sand grouse were mostly killed around water holes in the early morning or late evening. Many other birds that were not edible were killed for museum specimens.

The Mongols south of the Arctic divide do not engage in any agricultural or industrial pursuits. Their only occupation is the raising of ponies, cattle, sheep, goats and camels, with a few engaged as caravan men. Their food is limited to mutton and milk products with a little barley and brick tea which they secure from Chinese traders and merchants. What few articles of clothing and domestic utility they have are supplied by Chinese caravan merchants. There is no large center of population other than Urga, with a population of about 20,000. Kobdo and Uliassutai are small trading posts one time under Chinese influence but now under Russian, as is all of outer Mongolia wherein all the three cities are located. Save in the places mentioned and in "Lamasaries," the Mongols never gather in large groups, a few families being as many as are ever found together. All lead a nomadic life, following the thin grazing from mountain to plain and back again, according to the season. The "Lamasaries" are the churches, temples, or shrines of the Mongols. The yellow or red lamas or religious men are the scourge of the country. The lamasaries are the only semi-permanent structures in Mongolia other than the felt yurts in which the common or black Mongol lives. The lamasaries are built of mud or adobe and are usually of only one story in construction. They are all painted white and, of course, make good landmarks. In these, from a few to several hundred, all males, live and daily chant in the services of Buddha. It has been estimated that

over 80% of the population of Mongolia are "Lamas." This is quite appalling when it is considered with the fact that the remaining 20% includes all the women of Mongolia and a few men who carry on the herding which is, economically, all that keeps Mongolia going. At a Swedish Medical Mission, one of the party asked the Swedish Doctor in charge what percentage of his Mongols was diseased. The Doctor thought a minute, looked puzzled, and then answered "Oh! roughly I should say about 140%." When asked to explain he stated that he had cured some for a while, but they couldn't be cured for long as they always came back to be cured a second time. If it were not for the high and dry climate and a lot of good sunshine the Mongols would have probably been eradicated long ago by disease. As a Doctor accompanied the expeditions to look out for the health of the party, Dr. Harold Loucks in 1925 and Dr. Jose Perez, U. S. Navy, in 1928, always had their hands full with the Mongols. Men who had never in their lives had medical attention or a dose of medicine would come in to have a tooth pulled, a case of blood poisoning lanced, or the like. In one case a Mongol boy came in and explained to one of our Mongols, who in turn explained to one of the Chinese, who told Dr. Perez that the boy's father had been kicked in the face by a horse and was in a pretty bad way. Dr. Perez said that he would like to take a look at the boy's father; so, with a Chinese boy as interpreter, they took one of the Dodges and rode about 20 miles and found one Mongol outside of a yurt who pointed thumbs up, shook his head, then pointed thumbs down and nodded, meaning to say "We'll soon end the old man and throw him out to the dogs." However, Dr. Perez went into the yurt and found that a horse's hoof had removed practically all of the father's face below the eyes; that all of this had happened about two days before and that most of the face was still "as and where is." Dr. Perez sewed up the face from one ear to the other across the bridge of the nose and in a few days the Mongol looked as if it would still be a few years until the dogs had a feed of him. The Mongols are indeed a hardy race.

Except for a few stomach disorders caused now and then from bad water, only the Chinese and Mongols of the expedition required any medical attention during the 1928 expedition.

The topographic work done during the field season of the expedition was divided as follows.

Route maps. These were made with a telescopic alidade and plane table; the elevations were carried by vertical angles; the scale used was 1:200,000 and the contour interval, 50 feet. The distance was measured either by stadia or speedometer on the topographer's car. Compass reconnaissances on these; bearings were read with a prismatic compass and elevations were determined with aneroid barometers and Paulin altimeters. Distances were measured by speedometer. *Area surveys.* The scale used was 1:20,000 and the contour interval was usually 20 feet.

Astronomic Control and Magnetic Observations

The most important piece of work undertaken by the topographers was the execution of a route survey of the entire season's journey The geologists were anxious that this survey should be based on an established datum and consequently the line and levels were carried from a known elevation on the Peking-Suiyuan Railroad at Kalgan, which in turn was tied with Taku datum and Chin-wan-Tao datum. In 1925 this was carried from Kalgan to a point about 110 miles north along the Kalgan-Urga trail and from that point to the westward. In 1928 this line was extended to Erhlien or Iren Dabasu at the border of outer Mongolia on the same trail, and then tied again about 120 miles to the westward on the 1925 line, and from that point to the south and west for several hundred miles. Also several lines were carried to the east at different points along the Kalgan-Urga trail. In 1925 Major Roberts found that there were no natural features to use as turning points on account of the flatness of the country, so he evolved the plan of using cars for back and foresights. While the back sight was being taken on one of the cars, the other would run ahead and pick a point for a foresight. The back sight having been completed, the rear car would be signaled, run forward, and, while the foresight was being taken, pass the topographer's car and be ready to establish a foresight. Thus the topographer's car would "leap frog" the other two cars. The average days run was about 45 miles. In case of long shots curvature and refraction were corrected for. The levels were carried by the table. Usually it was possible to step the vertical difference; however, the Beaman Arc was used frequently. Several times during each day magnetic north was plotted on the field sheet, the Baldwin Solar Chart being used to establish the meridian and to orient the table. The compass was resorted to only when the sun was obscured by clouds.

In addition to these graphical determinations, observations were taken regularly, using the Gurley solar attachment to establish meridian. Distance was taken from the speedometer on the topographer's car which had been carefully rated prior to taking the field. During the field work it was checked against courses several miles long which had been laid out by stadia. In certain cases, when the use of the speedometer would cause excessive errors, the strip would be crossed by using the stadia. Sights up to 25 miles in length were used in locating mountains and adjacent features. In such instances a Gurley explorer's transit was used to measure the vertical angles. The results of the 1925 and 1928 seasons' work proved the system sound and possible of wide development. In addition to the check afforded by closure on control points there were opportunities to intersect on distant mountain peaks from various points. The invariable small triangle of error was a constant check on distance and orientation of base line. In addition to barometer comparisons, a check on line travels was afforded by vertical angles read to the various peaks from points along the line. It is believed

that a sound system of motor route surveying has been developed by Major Roberts. However, there could be modifications, principally in the use of target cars. Motorcycle side cars with folding or telescoping metal stadia rods could be developed, and, by bracing with a guy line or rod, it is thought that a rod at least 25 feet long could be used. This, of course, is considered only as it might be an aid to the surveyor.

Another phase to be considered is the excessive mirage which at times reduced the shots to less than half a mile and slowed up the work considerably.

With the above-described method a fairly good line has been run across Mongolia in several different directions which can be used as the backbone for additional surveys and reconnaissance to complete the map of that poorly charted country. This line will give reasonably accurate position and elevation, and should anyone wish to add to it from time to time all elevations of wells are given along the different routes and a start could be made from any of them. Wells are mentioned, as they seem to be the most stable of all the close features along the routes, although obos (piles of stone used to mark different trails during the winter when everything else is covered with snow) could be used.

Compass reconnaissance with correction for magnetic declination by use of the Baldwin solar chart was controlled only by closure on the starting point. These reconnaissances are over large areas and the data obtained can be used in revising such maps of Mongolia as already exist. In this type of reconnaissance, field sketches were made, full notes kept, together with detailed remarks, and the sketch was worked up on return to the base camp. Elevations were carried by the "Swedish Barometer" or Paulin System of Altimeter. It proved exceptionally accurate as to constancy and freedom of errors, much more so than the ordinary aneroid barometer.

Area surveys were made in localities where good fossil fields were found, and were used primarily for geological study and also to represent topographical type formations, such as typical ridge and vale topography of the grasslands area, upland and badland escarpments developed on later sediments, including windscour hollows on the peneplane, upland and escarpment with local badland development and a sand-obstructed valley; a typical desert lake with several well defined ancient beach lines; typical encroachment of the badlands on the grasslands; typical dwelling sites of the ancient "dune dwellers" and to show the setting of valuable paleontological discoveries. The latter type also show in addition to the topography the geology of the area. These area surveys were all done by use of the stadia rod.

Control and observations. Latitude was determined by observation of Polaris off the meridian; the hour angle computed and correction applied. For time and longitude the equal altitude method on both sun and stars was used. Three Hamilton chronometers, of which two were torpedo type clocks

and one a No. 950 (watch movement), were used and gave excellent results. For rating of the chronometers and corrections for time, a Grebe (10-200 meter) short wave radio set was used with wonderful results. Time signals were received from the Manila Navy Radio Station, and a weekly flash from the Peking Marine Station gave us our weekly news letter of current events. The latter was sent in a simple code, very slowly and repeated, for we had no expert radio men in the party. As one of our party spoke Russian and several other languages we were able to get the latest news reports from Vladivostok and Moscow as well as other radio broadcast such as lectures and musicals. Word was received in this manner that Peking had fallen to the Southerners and that Marshal Cheng-tso-lin's train had been blown up. Also via the short wave set word was received that all was well with the families of the different members of the expedition who had been left behind in Peking. No sending apparatus was taken, as its use would have seriously hampered the exploratory situation had the Chinese and Mongols found that we had it along with us. At the customary tax barriers, the receiving set went along as time receiving apparatus and as the loud speaker could be hooked up electrically with the victrola it excited no comment. All observations were made from positions that were occupied for several days at a time, so the observations were always checked with a second and third observation on different days and nights. The observations were made with a Gurley No. 124 Explorer's Precise Transit with Burt solar attachment, and all the plane table work was carried on with a Gurley's No. 582-A Alidade with a magnification of 21x and a Beaman Arc and gradienter attachment.

THE SELECTION OF ADVANCED BASES

By LIEUTENANT COMMANDER E. W. BROADBENT, U. S. N.

In planning a naval operation there are three distinct steps, namely:

1. Choose your objective
2. Choose your line of operations
3. Choose your bases.

This paper deals with the choice of bases, particularly advanced bases.

War on the sea is conducted by mobile forces. Mobility is an essential strategical characteristic of a fleet, and bases contribute towards the mobility of the fleet by supplying the fleet's needs. Therefore, in the selection of bases we must be guided by the operations of the fleet. Before base sites can be selected, the plan of operations, the scheme of strategical employment of the fleet, must have been determined.

Naval operations may be divided into two general classes:

1. Those which are part of a strategical offensive.
2. Those which are part of a strategical defensive.

Since even when engaged in strategically defensive operations a fleet must act offensively there can be little difference in the characteristics of the bases required to sustain the operations. The difference is in the arrangement of the system of bases, their relation one to the other, rather than in a base itself. The distinction lies in this, that in offensive warfare the bases are selected with a view to advancing farther into the enemy waters, whereas, in defensive warfare one must plan for a possible gradual retirement upon stronger positions to the rear.

We may accept as a proper guide in the selection of bases the fact that the choice must be dictated by the nature of operations of the fleet or the forces requiring a base.

What in general are the operations of naval forces in war? Briefly, they are:

1. Operations against the enemy fleet.
2. Operations on lines of communications, military and commercial.
3. Defense of coast lines.

Of these three types of operations, we are not at present concerned with the third, defense of coast lines. Operations on lines of communication will be covered in the consideration of operations overseas against a hostile fleet.

In a war overseas the periodic return of units of the fleets to the bases for overhaul is inevitable. The result in the effective strength of the active fleet is always less than its possible total strength, due to the number of ships absent, enroute to or from the base and at the base. The nearer the base

is to the scene of operations the shorter the periods of absence; the greater the effective force. Thus we find that the important strategic factors, time and space, that is, distance, dictate the first consideration in the selection of bases, namely, situation.

In strategical studies, one of the most important details is the disposition of forces. A strategical problem always presents this question: "What disposition of my forces will best enable me to accomplish my mission?" The chief consideration in the disposition of forces is that we may be able to bring to bear upon the enemy at the proper time and place a superior force. For example, at the outbreak of the World War came the question of selecting a base for the British Grand Fleet. Its objective was the German High Seas Fleet. The High Seas Fleet could gain the sea by sortie from the Baltic or Helgoland Bight. It could operate anywhere in the North Sea, from the Straits of Dover to the pass between Scotland and Norway. Scapa Flow and Rosyth offered excellent advantages as regards position and they were selected as main bases. Their relation to each other was such as to permit concentration in any part of the area of operations, and each was sufficiently close to the area to allow a minimum reduction in strength due to passage to or from the base.

There is an outstanding guiding principle in the strategical disposition of naval forces . . . they should always be advanced to positions as far to the front as can be securely held, from which they can be driven only by a superior force. Thus, in the Russian-Japanese War of 1904-05, the Japanese advanced bases for operations against Port Arthur were first established on the west coast of Korea, the most advanced point which could be securely held. Later, when the advance of the forces ashore made possible the change, the advance base was moved to the Elliot Islands, much nearer the objective, thereby facilitating the operations of the Fleet, reducing the time lost in passage from stations off Port Arthur to the base, increasing the force available for active operations, and giving greater assurance of superiority should the Russian Fleet attempt to escape by sea.

When the operations to be conducted are in defense of lines of communications, situation is likewise important. Lines of communication may be defended in a variety of ways, by escorting vessels, by patrol operations in the areas open to hostile operations, by concentrated action at focal points as at the termini or at narrow waters through which the sea lines must pass. There is no single method, unless it be that of convoys, which will provide reasonable protection against all forms of attack. Against attacks in force, the defense must rely upon the defender's ability to concentrate superior strength upon any part of the threatened line. This requires bases so distributed as to make possible such concentration.

Briefly, then, an advance base, whatever its mission, must first of all be well situated, centrally located as regards its particular area of opera-

tions, and near enough to that area so that the distance will not reduce the effective force to inferiority.

Having located the areas in which suitably situated bases may be found, the next consideration is *strength*. The strength of a base is both offensive and defensive. The offensive strength of a base is measured by its capacity to hold and assemble a large force of men and ships, and its ability to launch such forces safely and easily upon the sea. Adequate sheltered anchorage area should exist in the base. It can be provided only to a limited extent. Breakwaters can be built to provide shelter, but space is a natural feature. The space required is dependent upon the size and type of vessels to be sheltered. Anchorage areas must have good holding ground and be easy of access and egress. Narrow, crooked entrance channels increase the difficulty of access and egress and are easily blocked. In this aspect of strength the island of Lemnos was invaluable to the British during the Gallipoli campaign. The German Fleet base in the Helgoland Bight was peculiarly strong in this respect. The British bases at Rosyth and Scapa Flow, on the other hand, were less strong in these respects than was Helgoland Bight, but their situation had to be accepted. Two or more exits greatly increase the offensive strength of a base, making egress easier and blockade more difficult. New York, with its two widely separated exits, is a striking illustration of this point.

The defensive strength requisite in a base is a quality that varies considerably with the degree of importance of the base itself. A permanent main base should be so well defended that the Fleet need have little concern for the security of the base. It is obviously impracticable to provide all bases of whatever nature with such complete local defenses. In the extent to which the local defenses of a base fall below this standard the demands upon the Fleet are increased. When a fleet must defend its own base, the mobility of the fleet is decreased and, to use an expression of Mahan's, the fleet becomes tethered to its base.

As regards advance bases, a part of their defense may properly be contributed by the fleet. Advance bases are rarely to be found in waters entirely controlled by either belligerent. Therefore naval attacks on advanced bases may be expected, but the Fleet will not be far distant. Defensibility is, however, a necessary feature of a base. The land defense of permanent bases is the function of the Army. The land defense of temporary bases, and bases in territory seized from the enemy, is initially a function of the Marine Corps, hence the defense, as well as the seizure of bases, is a necessary subject of study for the Marines.

Among the important features in the defensibility of a base are configuration of the coast line and terrain. When a base is situated on a bay on the mainland, or on a large island, the difficulties of defense are considerably increased, due to its vulnerability to attack on the land side. Although

attack by naval vessels may be minimized when a base is so situated, attack from the land side is made easier. During the Civil War Charleston, South Carolina, was invulnerable to Federal attack from the sea and resisted capture for two years. Yet a brief and comparatively simple campaign ashore caused Charleston to yield almost overnight. Similarly, Manila Bay, impregnable from the sea, is open to attack from the land side and requires a considerable garrison for its defense.

The difficulty of defense is reduced if the length of the land lines to be defended can be shortened. A naval base on a narrow peninsula, such as Port Arthur, gains strength from its situation. Seven months of the hardest kind of fighting were required to reduce Port Arthur. Gibraltar, with a garrison of 200 men, held out against land attack for a considerable time in spite of great odds favoring the attackers. There is an inherent weakness in the defense of a peninsula, however, and that is that the attacking troops may receive active support from the guns of a fleet off shore.

When a naval base is located on a small island we have probably the strongest position as regards defense.

The nature of the terrain is an important consideration. Hilly, wooded country, cut by ravines and waterways, greatly facilitates defense, providing cover for batteries and troops. Low, flat islands may be easily swept by ships' fire and offer little protection for the defenders.

The defensibility of a base is affected by its proximity to territory occupied by the enemy. This is particularly true when the intervening distance is within the range of aircraft, or of bombardment by hostile shore or naval batteries. Thus Ostend, used by the Germans for a time as a submarine and destroyer base, had finally to be abandoned as a naval base due to the Allied air and gun attacks. Generally speaking, to be secure, the base defense must extend to adjacent islands or territory when their occupation by the enemy imperils the security of the base.

Briefly, the strength of a base is little, if any, less important than its situation.

The third requisite of a base is *resources*. Rarely may we expect to find in a prospective base site all, or even many, of the innumerable features of resources. Chief among resources are facilities for handling and storing supplies, and the means of restoring the vessels to active condition.

The facilities required for handling and storing supplies vary with the importance of the base. At an advance base it is probable that store facilities will be provided chiefly by supply vessels, and the principal requisite will be anchorage space for these vessels.

The most difficult problem in resources is the means available for reconditioning vessels. This work includes not only the work of maintenance and upkeep, but periodical dry-docking for cleaning of ships' bottoms and, most

important of all, restoring ships damaged in action. Work of this nature requires dry-docking and extensive repair facilities. The fleet tenders can be counted upon to furnish the shop facilities but the dry-docks will usually be lacking at advanced bases. So far as this feature of resources is concerned, it must be considered that advanced bases are rather supply and upkeep bases than anything more nearly approaching a main base.

Finally, no matter how well situated a base may be, what its strength and resources, if we cannot take it when we want it, it might as well not exist. The guns of a fleet are in themselves powerless to capture a base; only troops on shore can accomplish this, and the fleet can only support the troops. There is a technique in the capture of land by assault from the sea, and the chances are that the more desirable a base is, the more difficult will be its capture. It is essential that in the selection of bases, we understand not only the art of selecting them, but also the art of taking them. In the final analysis we may be compelled to select a base we can take rather than the base that best suits our needs.

Editor's Note: In a discussion among Marine officers of the subject treated of in the foregoing article, there is one point which we believe merits stress although the scope of the above paper scarcely affords the opportunity to bring it out:

The author states that "war on the sea is conducted by mobile forces." This characteristic of mobility is as essential to the forces which defend the bases as it is to any other element of the Fleet. They are an integral part of the whole and must be able not only to accompany the Fleet and establish themselves in an advanced base but, since the base must shift as the naval action shifts, they must be ready to move to another base rapidly and expeditiously. Their movements must be timed to the movements of the fleet. Any delay would slow down and impede the action of the entire naval force.

Mobility of the advanced base force of the Marine Corps should therefore be recognized as being of the utmost importance. All studies and plans of organization and training should be guided by that consideration.

MARINE CORPS COMMUNICATIONS

By CAPTAIN G. E. COLE, U. S. M. C.

THE TERM communications as applied to the Marine Corps includes the employment of all methods and means of transmitting and receiving orders, official messages and reports. It is through these communication channels that a commander directs the action of troops, receives reports of the enemy, and transmits to the higher command information which will assist in the coordination and cooperation of the entire force. Hence, in modern warfare, as well as in the routine operations of peace time, communications have assumed an importance that can scarcely be exaggerated, embracing as they do all phases of activity in post or field.

This is especially true of the Marine Corps, subject to periodical activities in little known, semi-civilized parts of the world where means of communication are so few and far between as to almost necessitate our being self-sustaining in this respect.

Changes in methods of communication have been so extensive since the world war that any reference to the lessons learned therein may well be considered as referring to ancient history. Progress has been by leaps and bounds and every day sees some new improvement or change. This is especially of concern to the Marine Corps in relation to the problems of maintaining channels of communication under the conditions encountered in primitive countries and merits the most serious consideration.

Since the world war the Marine Corps has the usual routine of peace time; expeditions, ranging in strength from a platoon to a brigade, sent to Central American and Asiatic countries where bush warfare is the rule rather than the exception. The exact procedure of operations of this class is not available in book form. Each situation demands a different solution and a different application of basic tactics. And while the principles of communication do not change materially with these different operations, it must be admitted that the demands made upon this phase of activity cannot be compared with those of any other branch of the military or naval service. To meet these demands in the future must be our objective if the Marine Corps is to fulfill its duties efficiently.

How to meet these demands in their entirety constitutes a problem too large in scope to be treated in an article of this length, involving as it does so many phases of communication each of which is of great importance. Therefore this article will attempt to deal with but one particular phase, one which is considered of paramount importance—that of radio communication. As this phase involves two great factors—material and personnel—each will be discussed separately.

Radio Matériel

In the design of any apparatus the manufacturer considers the purpose for which it is intended and constructs it accordingly with that specific purpose. This is true of Army and Navy radio equipment, designed to meet their individual requirements in accordance with their probable missions. In the past Marine Corps radio equipment, however, has been a mixture of both Army and Navy matériel secured from these services in an attempt to obtain a combination which would be best suited for our use. Unfortunately this has not proved practicable as—granting that we have the best equipment obtainable from the Army and Navy—the number of different type sets, the quantity of spare parts required as well as their variety, the difficulty of supplying essentials, and the great inconvenience of transportation as experienced in China and Nicaragua, tend to indicate that Marine Corps equipment must be still more modernized and especially adapted to our particular needs.

An example of this is the Army SCR 130-127 and SCR 109A field radio sets which were secured from the Army and adopted as standard equipment for the battalion, regiment, brigade, and smaller detached units for the reason that they were the only sets with sufficient range to meet our requirements. No doubt these sets were ideal for their particular purpose and we were shown every consideration by the Army in furnishing them to us in case of emergency but the fact remains that they proved unsatisfactory for our use due to their weight, limited range, and the heavy lead batteries with the accompanying battery charging set. As a matter of fact these sets cannot be used in tropical countries where motor or heavy pack animal transportation is not available. Another Army radio set, SCR 127, is by far the most practical field radio set for our use as it dispenses with storage batteries and utilizes a hand-driven generator, but here again the weight and bulk become objectionable.

In 1927, when the expedition to Nicaragua was dispatched, practically all available SCR 130-127 radio sets were in China with the expedition to that country, and as the Army was unable to supply a sufficient number, an emergency order had to be placed with a west coast manufacturer. After some delay, several light weight, high frequency field radio sets were obtained but in the meantime the communications personnel in Nicaragua was forced to resort to several high frequency sets which they constructed from spare parts in order to establish the initial radio system, which, upon the arrival of the radio sets from the United States, was later expanded to cover Nicaragua. These high frequency sets, although not without faults, actually proved superior to the Army field sets in range, portability, and economy of repair.

In China the establishment of a heavy duty, intermediate frequency, radio set capable of maintaining reliable communication for distances up to

1,000 miles called for equipment entirely new to the Marine Corps. Here again the situation was met by our communications personnel who constructed a 500-watt intermediate frequency and a 50-watt high frequency set from spare parts. However, in Nicaragua, where a set capable of operating with the Special Service Squadron was needed, we were forced to call on the Navy for a set capable of fulfilling our requirements.

Another factor which serves to strengthen the necessity of especially designed radio equipment for the Marine Corps is the narrow band of frequencies which the Navy Department has permanently assigned to the Marine Corps. The frequency assignment is six narrow bands between 2,000 and 4,000 kilocycles and five 200 to 600 kilocycles, the latter being approximately the frequency range of the SCR 130-127. Having these frequency assignments now makes it possible for the Marine Corps to design very efficient sets of low power and light weight in the frequency range of 2,000 to 4,000 kilocycles, which will have a reliable range of from 250 to 300 miles as compared to approximately 30 miles obtained with the SCR 130-127.

Personnel

The situation outlined under matériel finds a corollary in the problem which confronts the Marine Corps of adopting a definite policy which will insure that the personnel trained in radio work be of such number and degree of competency as to thoroughly answer all existing and future requirements.

Radio communication is essential to the Marine Corps if modern methods of warfare are to be followed. It must be further admitted that efficient radio communication demands technically trained and thoroughly experienced personnel. It is obvious that even with the best of equipment radio communications will be none the less dependent upon the skill and ability of those to whom this duty is entrusted.

It is the misfortune of the Marine Corps that our trained radio personnel is very unstable. Too often our best trained and experienced men seek other duty, or upon expiration of their enlistments separate themselves from the Marine Corps and either accept positions in civil life or transfer to the other branches of service. Many of these are men that we can ill afford to lose, possessing, as they do, technical training which requires special instruction in our signal schools and the actual experience in station and field which makes their services invaluable.

How to decrease the number of these separations is a problem which deserves our most careful thought. They must be decreased unless we are to continue to be a training school for other branches of the service. Some arrangement must, in the interest of efficiency and economy, be made to correct the following which it is believed constitute the underlying causes in the great majority of voluntary separations:

(a) Dissatisfaction with the present system of ratings.
(b) Uncertainty as to the permanence of radio duty detail.
(c) Objection of skilled and experienced personnel to working with new personnel of little ability or experience.

Of these three causes the first is considered the most important, although the other two are well worthy of attention. There is no question but what we are far behind the Navy and other branches of the service so far as pay is concerned, although as a rule our radio people are equal and in many cases superior in ability to those in the other services. In the Navy especially, the lowest rating that an operator holds is that of radioman third-class, while the great majority of our operators hold ratings lower than that of sergeant. This condition is almost certain to breed dissatisfaction when it is considered that a sergeant's pay is less than that of the radioman third-class. Our people naturally feel that their pay should be on a parity with other service branches but under present conditions this is impossible. Rating our personnel higher than the grade of sergeant is the exception rather than the rule and consequently a week rarely passes that we do not lose valuable men to other branches of the service or positions in civil life.

In addition to the foregoing we find many of our best men seeking other details in the Marine Corps itself in the belief that promotion will be easier to obtain in the performance of other than radio duty. This is part of the second cause—"uncertainty as to the permanence of radio duty detail." This uncertainty is injurious to the efficiency of our radio people who often fail to devote themselves whole-heartedly to the mastering of radio in the belief that such study and effort would be wasted if by chance they are assigned to other duty. It is admitted that at times the exigencies of the service require the detail of experienced radio men to other than radio duty but in many cases men are lost to radio work unnecessarily. It is surely not economy for us to send a man to signal school for a period of six months or more, have him trained in those duties peculiar to radio communication, and then assign him to some other duty. Still this is often the case and we find our trained radio man doing duty in a capacity where his radio training and knowledge are wasted. The psychological effect of the foregoing on the man concerned is easily apparent. He loses interest in radio and seldom seeks to be reassigned to such duty.

In the case of the third cause it is believed that the condition is a direct outgrowth of the preceding two. Due to the constant turnover of our radio personnel as a consequence of discharge and separations it is very difficult to make replacements with trained men, and as a consequence we are forced to use men of little experience or ability. Most of them are graduates of the radio school at Quantico and while they may have a fair basic knowledge they are lacking in practical experience. There is no substitute for practical experience in the performance of radio duty and we, therefore, often find such men unable to handle the work assigned to them. As a consequence the

experienced men are forced to perform arduous extra duty and act as instructors until the replacement is able to perform his duties efficiently.

All of these foregoing conditions have existed in the Marine Corps for years due to the general policy against specializing in the technical branches and it will doubtless be very difficult to change this well established custom. A change must be made, however, if our radio communications are to be brought to the point of efficiency which our peculiar duties require.

Radio communication personnel are in greater demand now than ever before, not only in the military and naval services but also in commercial activities and golden opportunities are open for trained men in civil life and other branches of service which are by law authorized to offer them better compensation for their services than the Marine Corps.

The problem in regard to materiél has been temporarily solved by the adoption of radio equipment especially designed for our use. The most modern equipment is being secured and, when issued, our radio materiél will be second to none in use in any branch of the Army, Navy, or civilian activity. To handle this splendid new equipment it follows that our personnel must be highly specialized and continuously under training to insure the functioning of our radio communications under any and all conditions that may arise in the future whether it be expeditionary duty or a major war. It is therefore believed that the time has arrived when the Marine Corps must specialize along technical lines relating to radio communication and organize and technically train our radio personnel, making the best use of their knowledge and experience to raise the standard of our radio communication service in general. Causes of dissatisfaction should be removed and radio duty made so attractive that experienced, competent personnel will be retained, thereby guaranteeing efficiency in the carrying out of all our radio duties.

PROFESSIONAL NOTES

Communication Notes

THE following radio frequencies have been permanently assigned to the Marine Corps by the Secretary of the Navy under date of 17 July, 1929:

Use	*Frequency Range*	*Frequency Assigned*
Inter radio nets	2500-5000 kcs.	3035
		3065
		3095
		3155
Inter radio nets	272-545 kcs.	425
		445
Aircraft nets	272-545 kcs.	545
		565-standby
		585-standby
Aircraft artillery spotting	2500-5000 kcs.	2545
Aircraft command planes	2500-5000 kcs.	2685

A board of communication officers was convened at Headquarters, U. S. Marine Corps, by order of the Major General Commandant, to make recommendations as to the procuring of suitable radio signal equipment and the disposal of obsolete equipment. The recommendations of this board were approved in substance as follows:

(a) That the Marine Corps be furnished with one hundred (100) field radio sets, frequency range 2500 to 25,000 kilocycles of the master oscillator power amplifier type, using the latest vacuum tube procurable, to be capable of a working range of approximately 250 miles, equipped with hand generator unit and gasoline generator unit. Total weight of hand generator set approximately 110 pounds, consisting of two units—transmitter and receiver cabinet and power unit, both with gasoline engine and hand-driven generator units and of such design that they may be used to operate the SCR 130-127 Army radio set.

(*Note:* The development work on these sets has been completed and the first set delivered to the Marine Corps for tests which have proved very satisfactory A contract has been let for three additional sets which should be available for issue to troops in the field within the next ninety days.)

(b) That the Marine Corps be furnished with four radio communication trucks embodying the following: Truck equipment to consist of a high frequency and intermediate frequency transmitter; frequency range 250 to 600 kilocycles and 4,000 to 30,000 kilocycles of the master power amplifier

type with continuous variable frequency, capable of being operated by remote control at two miles distance, the power supply to be independent of the truck power plant. All radio material to be easily dismantled and set up independent of the truck. The high frequency range to be not less than 1,000 miles and intermediate frequency range not less than 250 miles. Two radio receiver sets will be provided, one covering the intermediate frequency range and one to cover the frequency range from 10 to 30,000 kilocycles. In addition to the radio equipment this truck will be equipped with all signal equipment for a forward echelon of a brigade or smaller unit, as follows:

Message Center—10 days' supply of forms and stationery.

Telephones—One 12-drop monocord switchboard; 5 miles of outpost wire; 7 field telephones; lineman's equipment and tools. One hundred percent spare batteries.

Radio Panel Section—Radio equipment as described above, necessary panels for signaling, and complete pyrotechnic equipment.

The crew of this truck will be composed of one officer and five enlisted men.

(*Note:* It is believed that the above radio communication trucks will be constructed by the Marine Corps, due to the excessive cost of commercial manufacture. The bill of material for one truck has been prepared and will be purchased by the Quartermaster in the near future. This truck will be used as an experimental truck for the further design of the standard communication truck to be adopted by the Marine Corps.)

The necessity for the use of storage batteries in the future types of radio equipment for the Marine Corps has been eliminated. All vacuum tubes in future radio equipment will be standard insofar as practicable. The present SCR 130-127 will be converted to use the UX 864 vacuum tube (this tube has the same characteristics as the WD 11-12 but is microscopic and much more sturdy) for receiving and the new screen grid seven and one-half watt tube to be used for transmitting. This new type transmitting tube increases the effectiveness of the SCR 130-127 approximately 96%. These tubes are the same as those to be used in the field equipment which, together with the new hand-driven and gasoline driven generators, standardizes these parts for all Marine Corps field equipment.

Changes in Materiel

As a result of service and operations conducted in Nicaragua during the past two years, various changes in forms of equipment, as issued, have been found necessary or desirable for use under the conditions existing in that country. As all those members of the Marine Corps who have served in Nicaragua know, the country is most mountainous, heavily wooded, with for the most part rocky, mountain trails as a means of communication. Owing to the condition of these trails, the Browning Automatic Rifle has been

found, due to its unusual length and weight, to be a heavy and unwieldy weapon for use by patrols. For this reason, this rifle has been modified to the extent of reducing the length of barrel by 7½ inches. This modification has resulted in a reduction of approximately one pound in weight, and sufficient reduction in length to permit of its being carried with facility in the rifle boot, as issued. Heretofore, it had been necessary to slit the bottom of the rifle boot and to allow the muzzle of the automatic to project therefrom, rendering it, of course, liable to injury from striking on various obstacles and becoming filled with mud, dirt, and water. The modification of this rifle in the manner noted has no appreciable effect upon the accuracy of the weapon, but does slighly decrease the muzzle velocity and to some extent increases the flash. These rifles, as modified, will be issued to the Second Brigade, Nicaragua, upon request by the Commanding General of that organization.

Another article of equipment which has been modified upon recommendation of officers serving in Nicaragua is the meat can. The old type of flat meat can cover has been replaced by a cover having the general shape of the meat can itself. This cover is divided longitudinally by a partition, thereby affording two deep compartments suitable for separating articles of food. This cover fits down within the meat can and is held in place by the meat can handle, as in the old form. As will be noted, by this change two extra compartments for the separation of articles of food are provided, with no increase in weight or space occupied by the meat can in the man's equipment. It is considered that this change will greatly improve the messing facilities under conditions usually encountered on expeditionary service.

Motor Lighters

The Board, which has been conducting tests for some period of time upon various forms of experimental Motor Lighters, commonly known as "beetle boats," has completed its deliberations and forwarded its report for action of higher authority. The lighters tested by the Board are the 50-foot armored motor lighter, the 40-foot motor lighter, and the 45-foot artillery lighter. In addition to the tests already completed, it is intended that the lighters will be tested further to determine their ability in surf. Further tests will also be made wherein embarking and disembarking regular organized units of infantry and artillery will be performed. As a final test, it is desired that actual embarking and landing of troops from a transport by means of these lighters be accomplished. The date of completion of the tests contemplated at present is indefinite.

Semi-Automatic Rifle

At present a Board convened by the War Department, and having one Marine officer and one Naval officer as members, the remainder of the Board

being composed of Army officers, has recently been conducting extensive tests on various types of proposed semi-automatic rifles with a view to selecting a suitable type for adoption. There are now under consideration by the Board four types of semi-automatics which have been placed before the Board by their inventors. For the past month extensive tests have been conducted by a subcommittee at the Army proving ground, Aberdeen, Maryland, and it is expected that in the near future a meeting of the entire Board will be held for the purpose of receiving the report of this subcommittee. It is believed that at that time further details in connection with the rifles under consideration may be given out.

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